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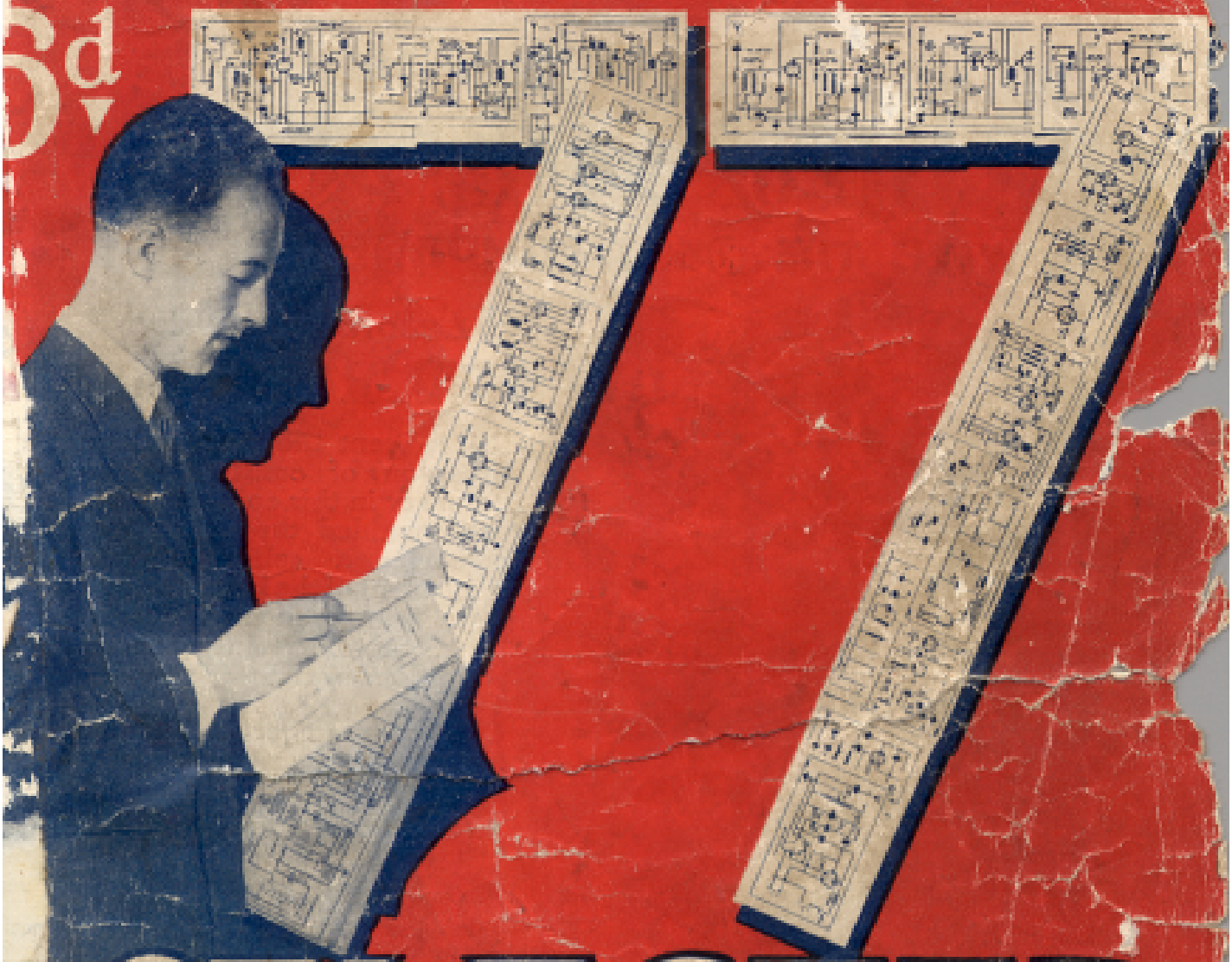

77 SELECTED CIRCUITS

THOROUGHLY PRACTICAL—ALL CAREFULLY TESTED

erfully comprehensive collection of seventy-seven specially picked circuits covering all radio set and unit arrangements. Battery circuits from one to five valves, mains sets, nits, rejectors, special units, etc., etc., are included. Every instrument described has been and given extensive practical tests, and comes up to the highest standard of efficiency. efore has such a magnificent assembly of up-to-the-minute designs been presented in one book.

PREPARED BY THE TECHNICAL STAFF OF

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Build the
CIRCUIT of SATISFACTION
WITH THE RIGHT COMPONENTS!

Laboratory Tested

DUAL-RANGE COIL

R.I. present the most amazing precision of construction and accuracy in this coil. It is bakelite moulded throughout, and embodies a self-centring arrangement of the inner and outer coils, which ensures absolute wave-length certainty under all conditions of temperature.

Every coil is subjected to exacting tests on the wavemeter and inductance bridge and in special "Dual-Ranger" circuit apparatus. Note the clearly engraved terminal identification marks, simplified fixing lugs and beautiful finish.

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Write for the New Season's Catalogue and "DUX" Leaflet which gives full Technical data and suitable circuits.

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Credited by the Technical Press with a performance equal to transformers at many times its price. Remarkable primary inductance of

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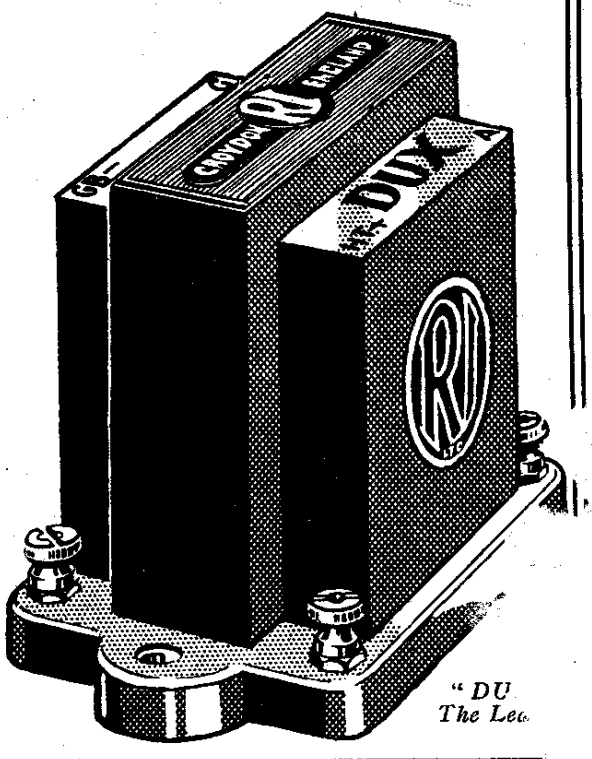

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Advertisement of Radio Instruments Ltd., Croydon, England. *'Phone: Thornton He*

77 SELECTED CIRCUITS

On this page every one of the specially tested circuits is listed under the various sub-heads, to enable you quickly to turn to the particular ones in which you happen to be interested. You will find the two full-page articles (Pages 2 and 21) of particular help when working from circuit diagrams.

CONTENTS

WHICH ONE WILL YOU CHOOSE?

Do so many circuits together seem a little bewildering to you? On this page you will find some tips on picking out the right one which will make your choice both easy and fascinating.

SEVENTY-SEVEN circuits! And every one of them a thoroughly practical arrangement which has passed stringent tests in the WIRELESS CONSTRUCTOR laboratory.

We make this the introductory remark to our article on choosing a circuit because we are particularly anxious to stress the fact that you can choose *any* circuit in the book with full confidence that it has had the Research Department's "O.K." and is therefore a thoroughly sound arrangement.

EVERY ONE TESTED AND TRIED.

So that when you turn over the pages with a view to selecting a receiver design, don't concern yourself with thoughts of whether it will work; concentrate rather on the choice of a circuit that will be most suited to your particular requirements. And when you have made your choice, then build it up! You have our word for it that you will be "on a good thing."

Some of you will want headphone receivers; others will be interested in the popular "detector and two L.F." arrangement—many of you will no doubt have leanings towards an ambitious long-distance set.

Well, whatever the circuit you may be requiring, whether it be anything from a simple crystal receiver to an elaborate all-mains outfit, you are almost certain to find just the combination you have been looking for within the covers of this book. Indeed, the circuits in this book have such a wide range of appeal, and are of such a varied character, that we feel it is desirable to give some advice regarding the considerations governing the choice of a suitable design.

In general, there are two main things to be considered when making your choice. The first is the amount of money you wish to spend on the outfit, and the second is the standard of results you want to suit your particular requirements.

Before you decide on building up any of the circuits in this booklet, read this page. It will help you to choose the most suitable arrangement for your purpose.

HOW MANY VALVES ARE NEEDED?

In the case of a local type of receiver, both these considerations are necessarily governed by your distance from the station, for you cannot expect to hear loud-speaker results with, say, a two-valver if you are outside the two-valve loud-speaker service area of the station.

Supposing you desire to hear your local station at adequate loud-speaker volume for all normal domestic requirements for the minimum amount of initial expense. If you are within a radius of 15 or 20 miles from a regional transmitter, then a two-valver used in conjunction with an average outdoor aerial would answer the purpose admirably.

The distance at which a two-valver will give adequate loud-speaker results naturally depends upon the power at the transmitting end, and it wouldn't be correct to say that 15 or 20 miles would be the effective loud-speaker range in every case. On the contrary, if your local station is fairly low-powered it may be possible to obtain satisfactory loud-speaker volume from two valves up to distances of only about 10 miles.

It is, as you will see from this, almost impossible to lay down any hard-and-fast rules concerning "miles-per-valve," because it is all so much a matter of local conditions. So that when selecting a set, if it is a case of choosing the smallest one possible to give you decent loud-speaker volume in your particular locality, you would be well advised to make a few enquiries in the district as to the type of set most commonly in use. You will then have something more or less definite upon which to work when making your choice.

THE QUESTION OF RADIO-GRAMS.

But this is not by any means the only aspect to be considered when choosing your circuit. Even supposing you have definitely decided upon the number of valves you intend to use, which of all the one-, two-, three-, four- and even five-valvers will be most suited to your requirements?

Is it to be a radio-gram? Must it be a super-selective arrangement? Will you be wanting to work it in conjunction with H.T. batteries or an eliminator?

These are all points that it will be necessary to consider before your final choice can be made, and perhaps a few words of advice in this connection would be helpful.

Let us consider first the question of whether it is to be a radio-gram. Well, if you are in the three-or-more-valves' class—why not?

Even if when you build the set you do not feel disposed to incur the additional expense of a pick-up, the cost of the switch to make the set dual-purpose is so very small that it is a well-worth-while investment. There is always the possibility that you may want to use a pick-up later on.

But perhaps you have no interest with gramophone music, or maybe you do not possess a turntable.

Well, whether it is to be a pick-up or no pick-up arrangement, you will find your needs catered for in this book.

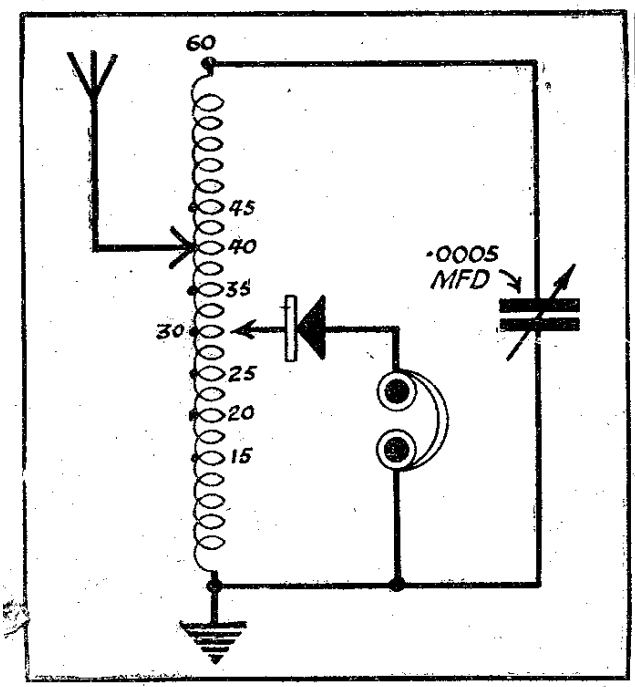
Then what about selectivity? Here again it is so largely a question of local conditions that much the best plan would be to make inquiries from people in the district as to the standard of selectivity required.

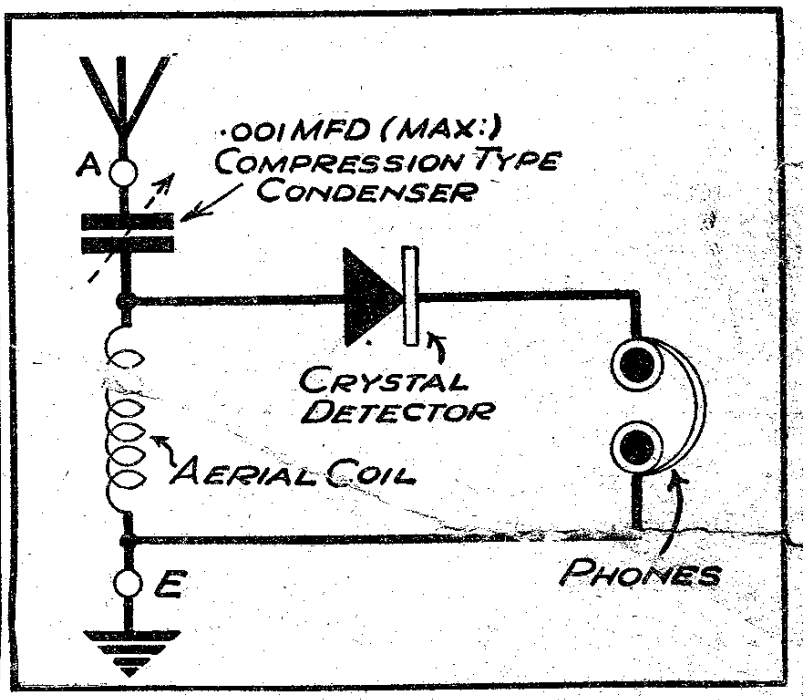
USING A MAINS UNIT.

Some of you will want a selector coil circuit. Others who want to search while the locals are working may require a set with H.F., or at least a very selective "detector and L.F." arrangement. For others not resident in regional areas a perfectly straightforward circuit will no doubt meet the case.

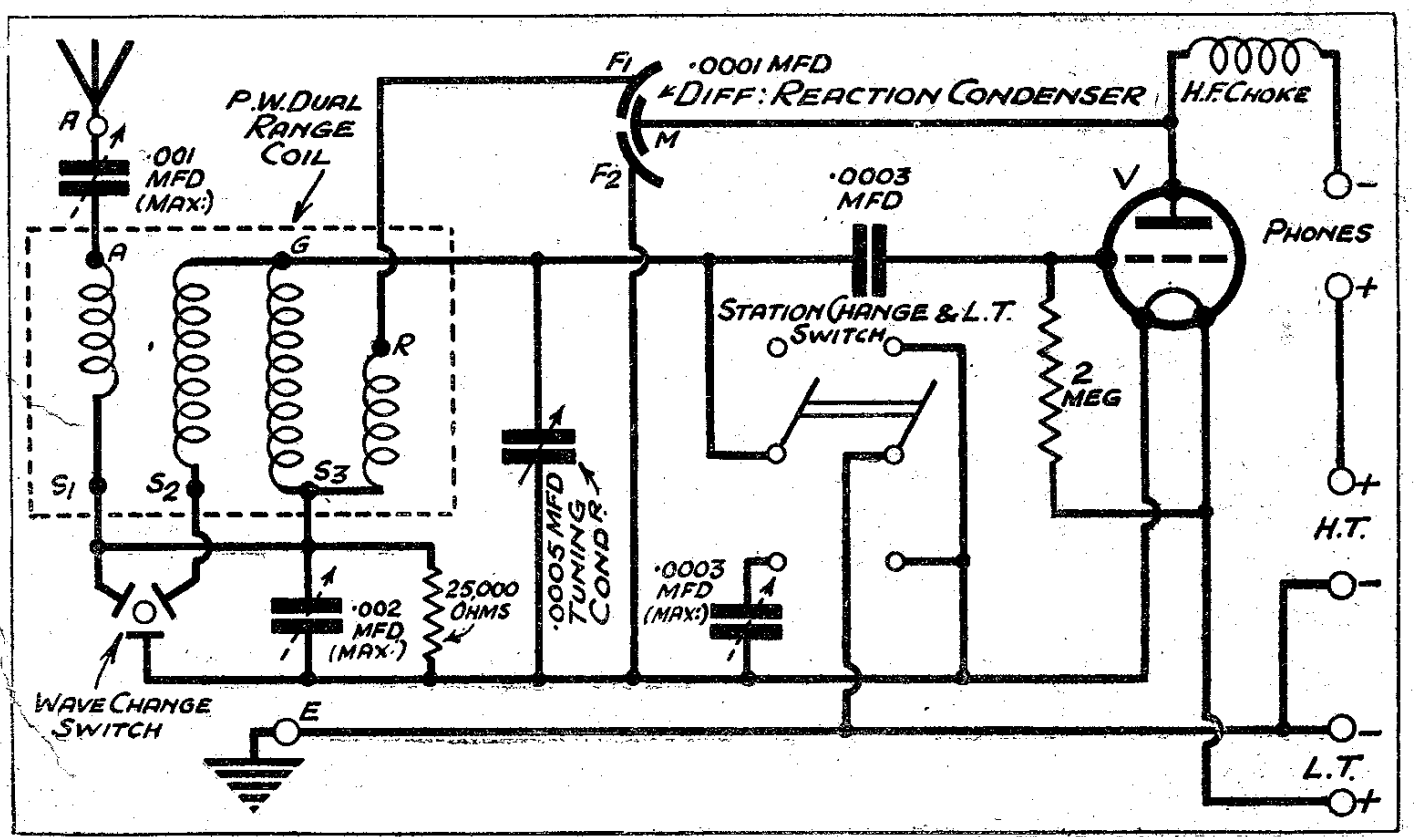
With regard to the use of mains units in conjunction with these sets, almost every circuit which incorporates an output filter and has de-coupling is suitable for this.

EVERY CIRCUIT TRIED AND SELECTED BY THE "WIRELESS CONSTRUCTOR" TECHNICAL STAFF

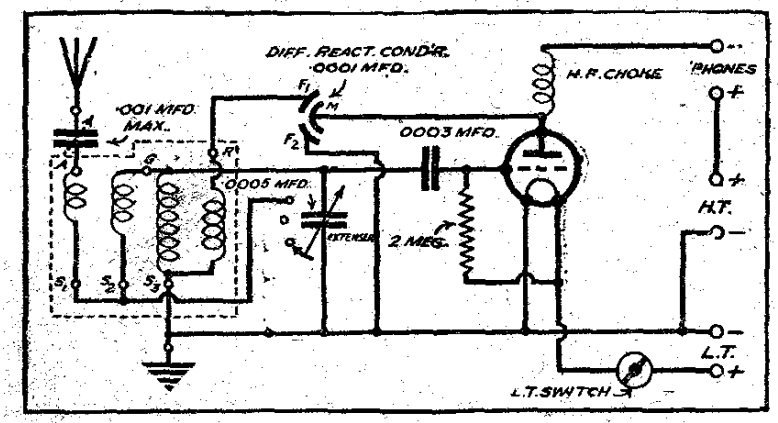


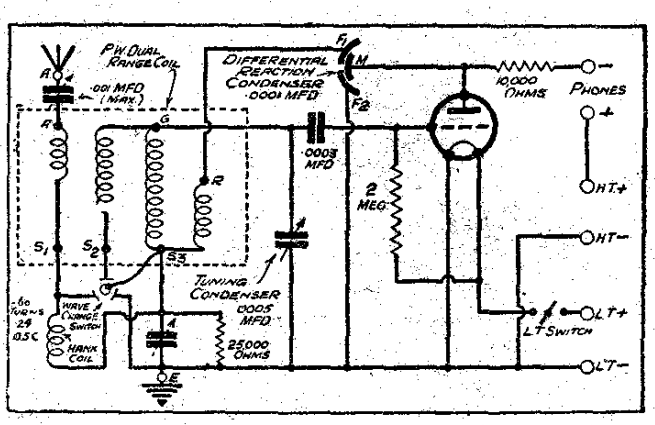


CIRCUIT No. 1 (left) is a simple but efficient type of crystal receiver in which the coil is made by winding 60 turns of No. 24 D.C.C. wire on a 2½-in. tube. **CIRCUIT No. 2** (right) shows a series-tuned crystal receiver in which tuning is carried out by means of the compression condenser. The coil should be a No. 60 or 75 plug-in for medium waves, and a No. 250 for long waves.

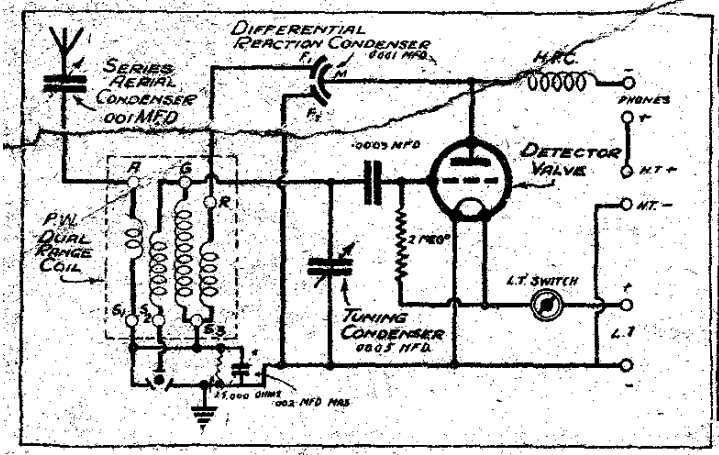


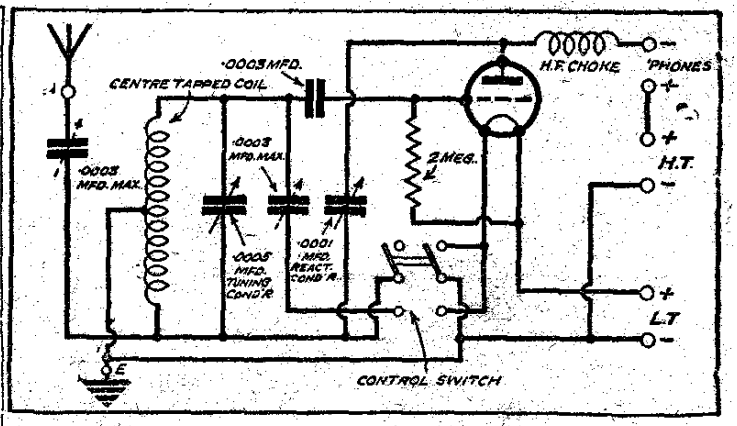
CIRCUIT No. 3 illustrates a simple one-valve arrangement with automatic station-change switch for Regional areas. The main tuning condenser (·0005 mfd.) should be adjusted to lower-wave station. Leaving that set, switch in the compression condenser (·0003 mfd. max.) and adjust it until the higher-wave station is heard. When searching for distant stations, tune with main tuning condenser and switch compression condenser out of circuit. With switch in neutral position set is switched off.



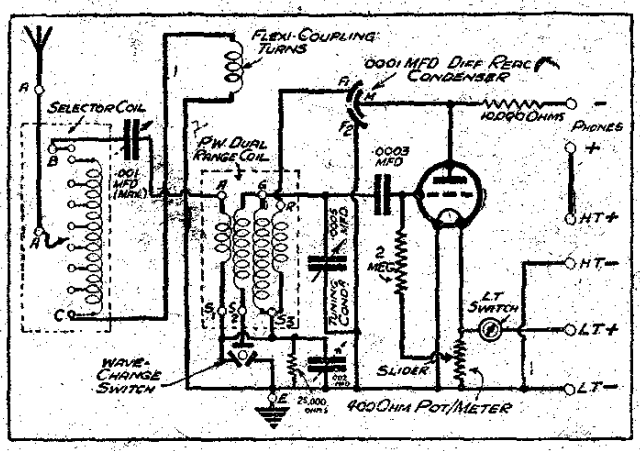


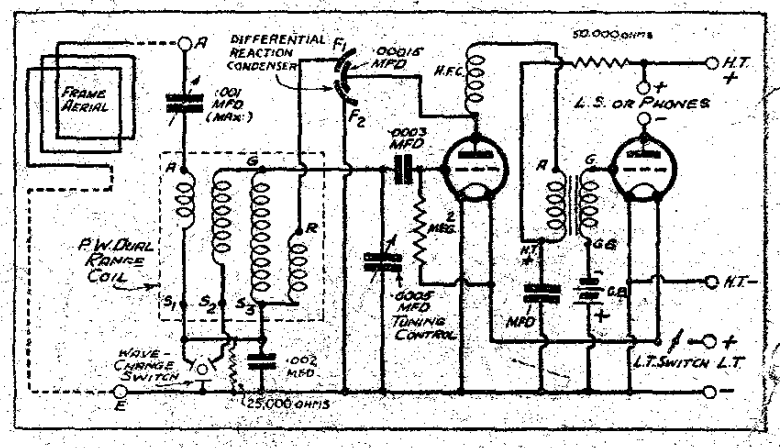
CIRCUIT No. 4 (left) shows a combination of a "P.W." coil and an Extenser. This circuit makes an ideal domestic headphone receiver because the controls are reduced to a minimum. Wave-changing is done automatically by the Extenser. When it is between 0 and 99 the set is on medium waves, whereas a three-figure reading indicates a long-wave station. Selectivity can be adjusted by the compression condenser in the aerial lead. **CIRCUIT No. 5** (right) is ideal for station-searching on headphones. In this case wave-changing with the "P.W." Dual-Range coil is effected by means of a separate three-contact push-pull switch, which must have provision for connection to the metal plunger in addition to the three normal terminals.



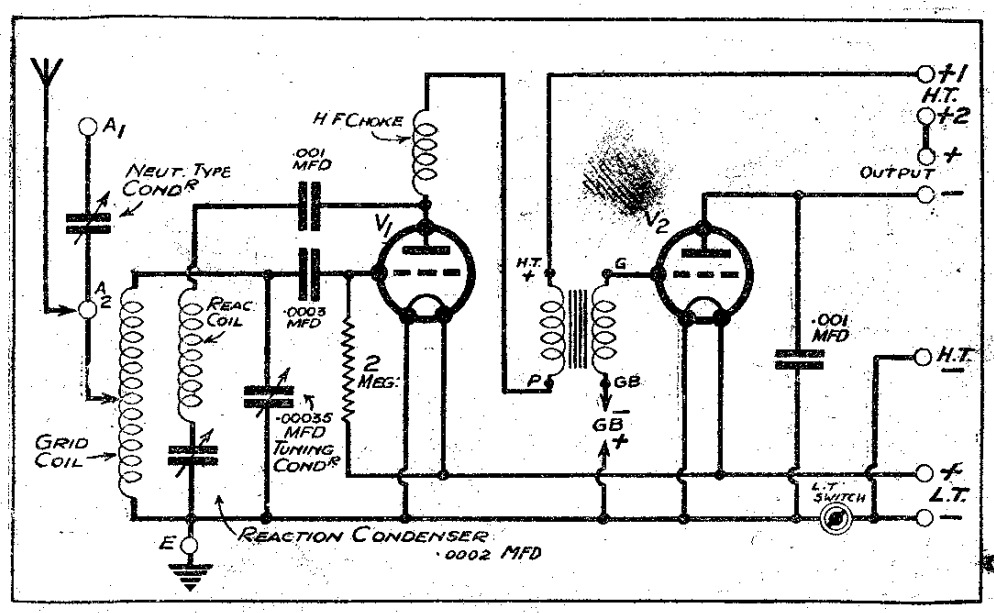


CIRCUIT No. 6 (left). An efficient and sensitive dual-range receiver for use with headphones. This circuit is on the same general lines as Circuit No. 3, but shows how to omit the station-change switching arrangement. **CIRCUIT No. 7** (right) is a form of Hartley receiver which gives exceptionally smooth reaction control. The double-pole change-over switch enables the set to be switched automatically from one station to the other in Regional areas, and the method of adjustment is clearly indicated in Circuit No. 3. The coil should be a No. 50 centre-tapped plug-in for medium waves, and a No. 200 centre-tapped for long waves.



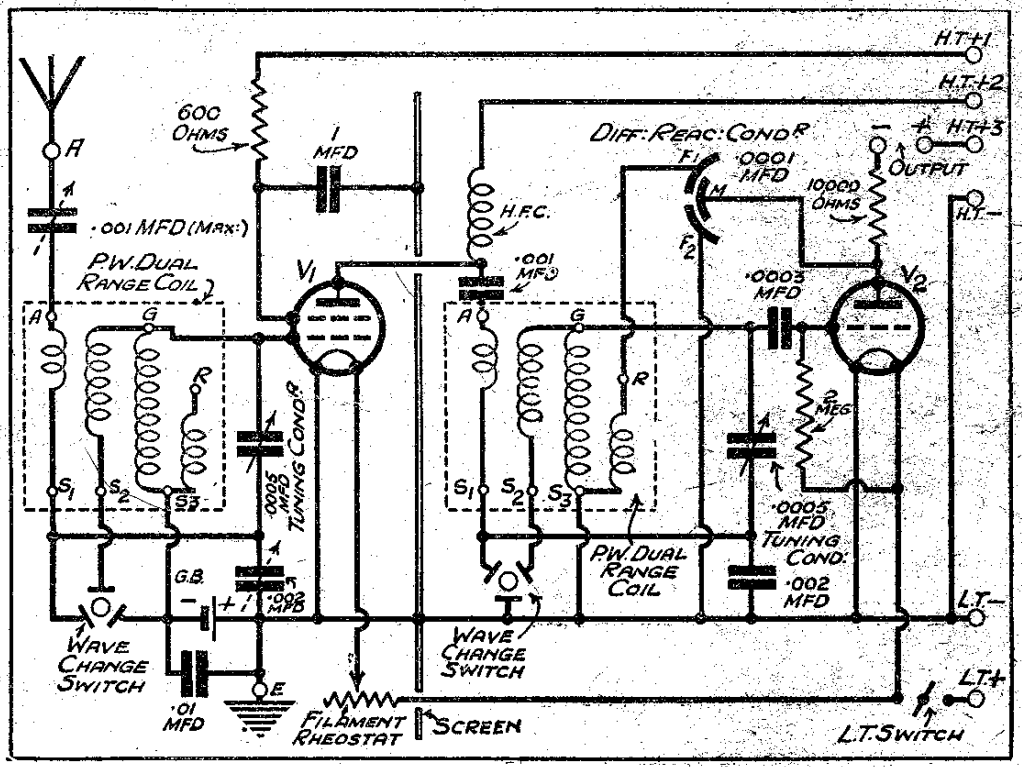


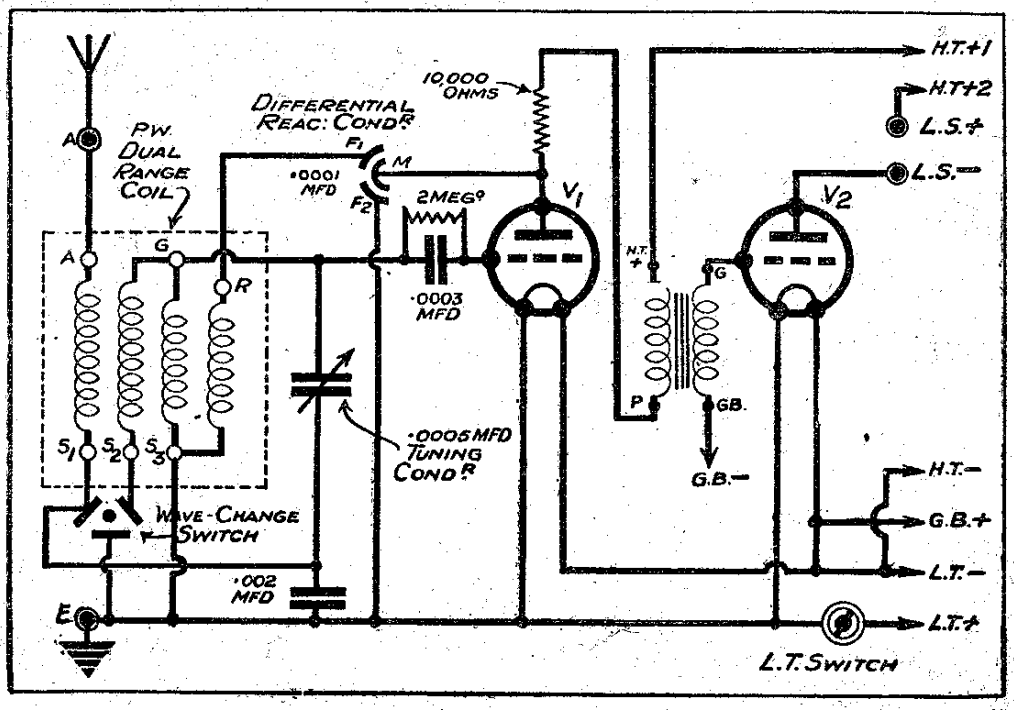
CIRCUIT No. 8 (left). A particularly selective single-valve receiver for long-distance reception with headphones. The flexi-coupling is carried out by winding two or three turns of ordinary rubber-covered flex round the outside of the dual-range coil. On long waves, selector coil switch-arm should be left on stud B. **CIRCUIT No. 9** (right) illustrates an interesting dual-purpose receiver which can be used on long and medium waves with an outdoor aerial or on medium waves with a frame aerial. This particular arrangement is very suitable for a compact two-valve portable receiver. On a 2-ft. frame the aerial would consist of 14 turns of No. 24 D.S.C.



Plug-in coils are the basis of CIRCUIT No. 10 (left), and by using the A_1 terminal and suitable coils, short-wave stations can be received in addition to the normal medium- and long-wavers. Coil sizes are as follow: Medium waves, No. 60X or 75X for grid coil and No. 40 or 50 ordinary for reaction; long waves, No. 250X grid coil and No. 100 or 150 ordinary for reaction; ultra-short waves, 4-turn grid coil and 4-turn reaction coil. Use terminal A_2 for medium and long waves.

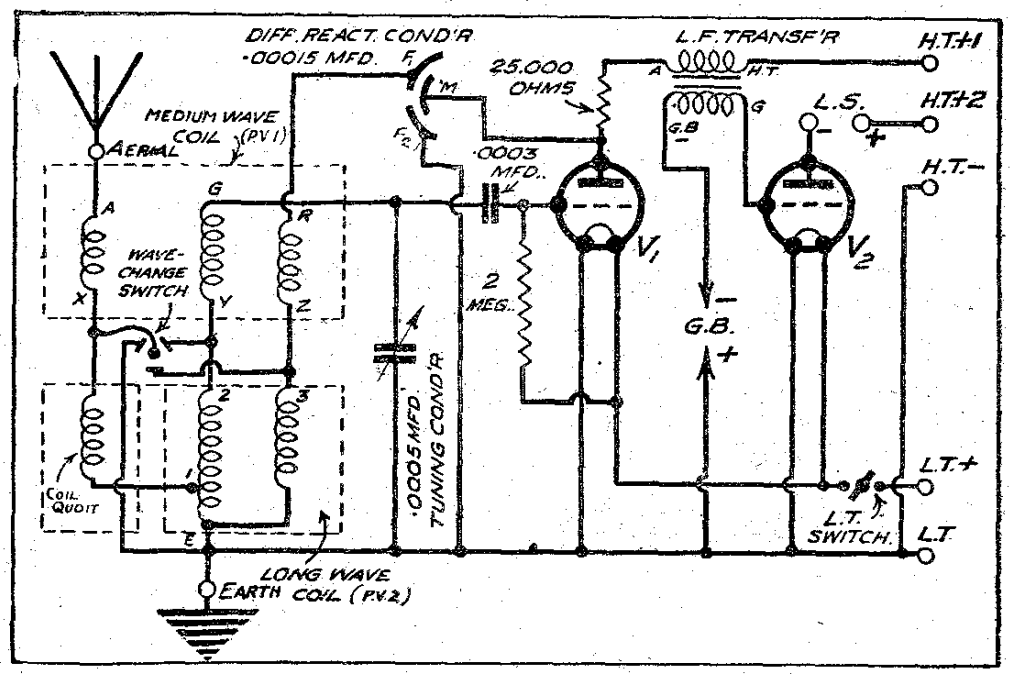
CIRCUIT No. 11 (to the right). A sensitive and selective long-range receiver for the headphone enthusiast. This circuit makes an ideal "H.F. and Det." unit for use in conjunction with the amplifier shown in Circuit No. 26. Selectivity can be varied by adjusting the compression condenser in the aerial lead. The rheostat in series with the filament of the screened-grid valve is for purposes of controlling the input to the detector when working on nearby stations.

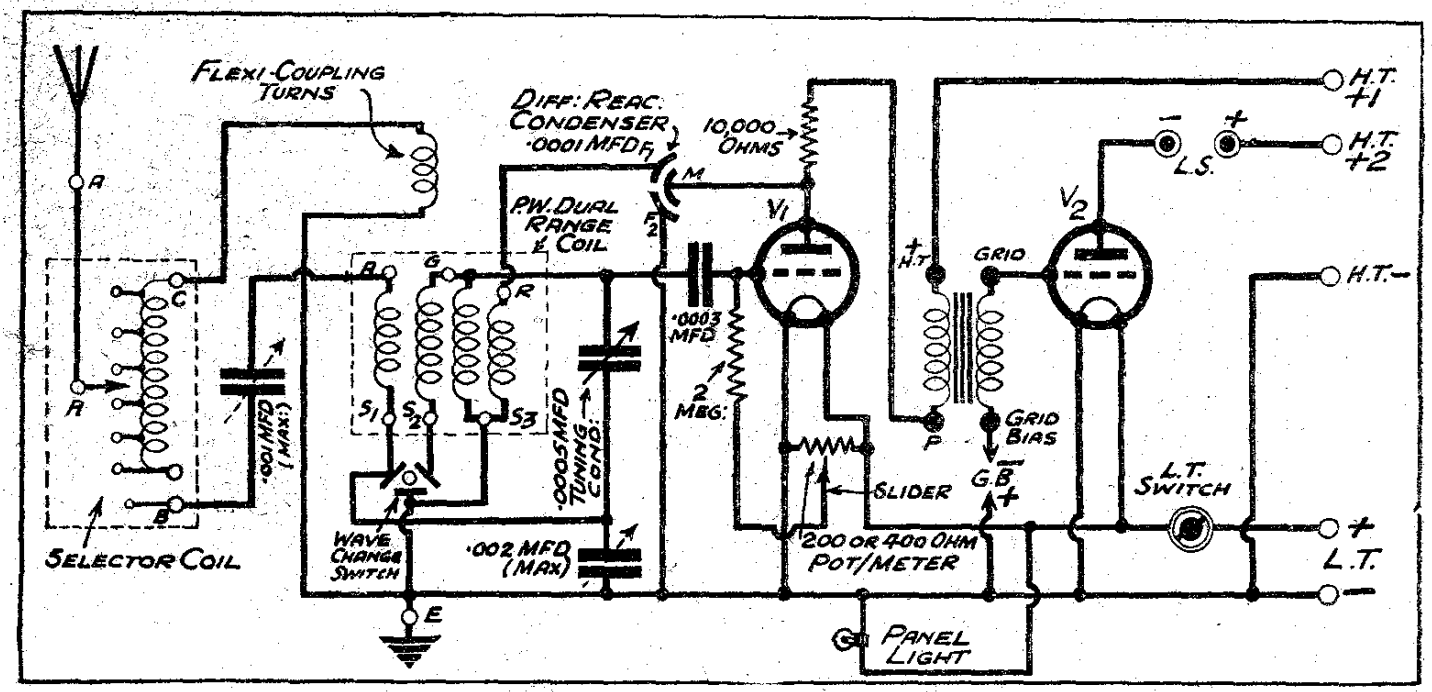




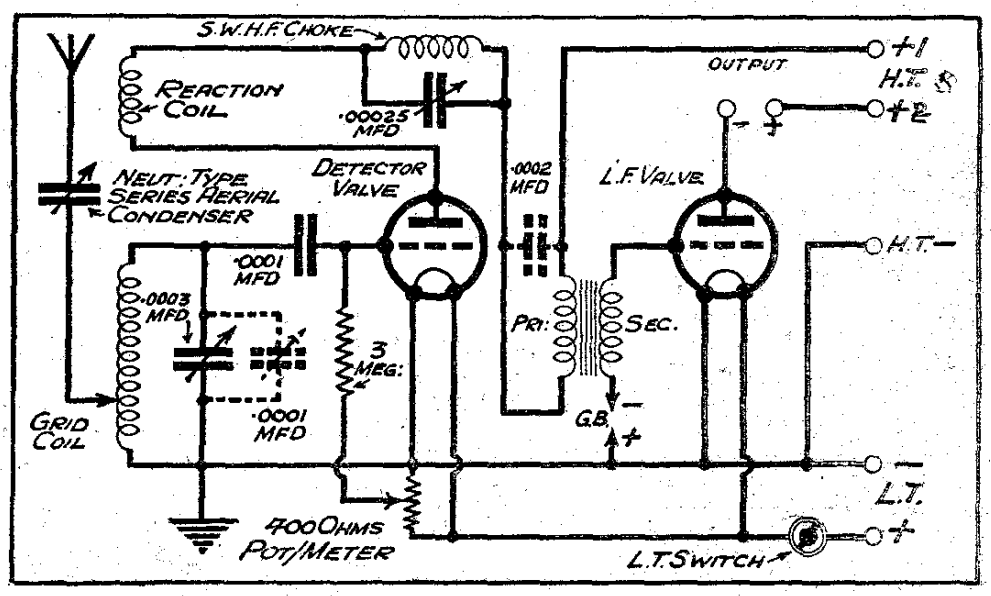
CIRCUIT No. 12 is a very popular "Det. and L.F." arrangement employing the famous "P.W." Dual-Range coil. This circuit will give excellent loud-speaker results up to distances of about 15 miles from Regional stations providing it is used in conjunction with a reasonably efficient outdoor aerial. An H.F. choke can, if desired, be used in place of the 10,000-ohm "Spaghetti" resistance.

CIRCUIT No. 13 (to the right). An efficient wave-change receiver incorporating the new high-efficiency "P.V." coils. The coil-quoit winding which prevents medium-wave "break-through" on long waves consists of 60 turns of No. 24 D.S.C. wire. Note the special type of wave-change switch employed. This is of the four-contact type, or a three-contact type with a flex lead attached to the plunger.



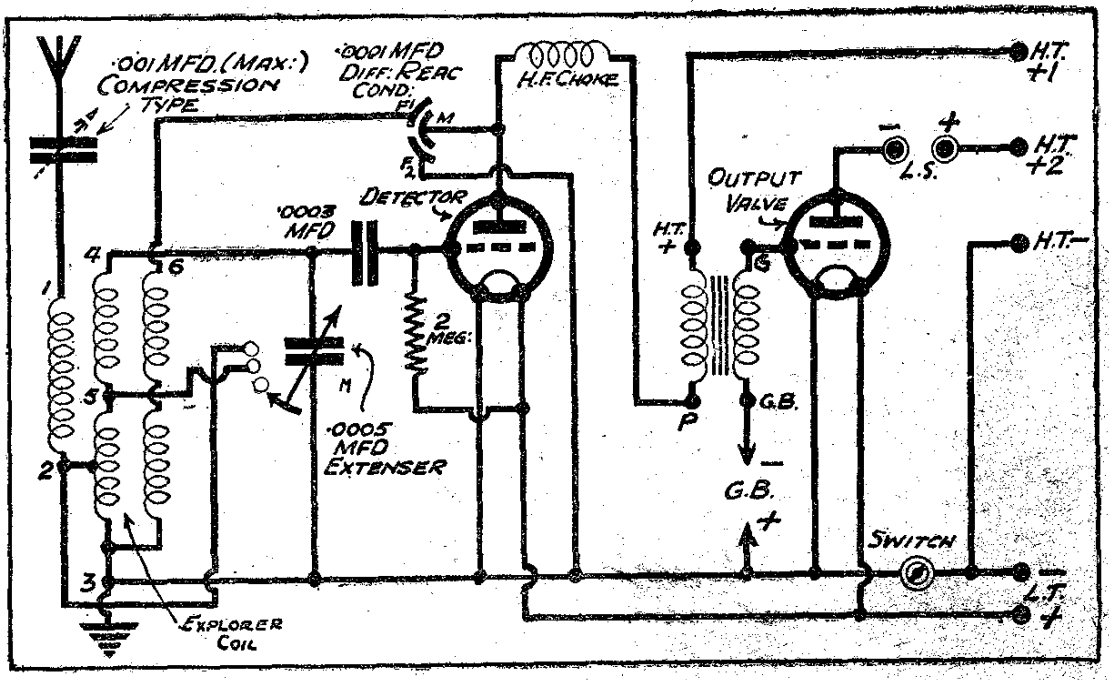


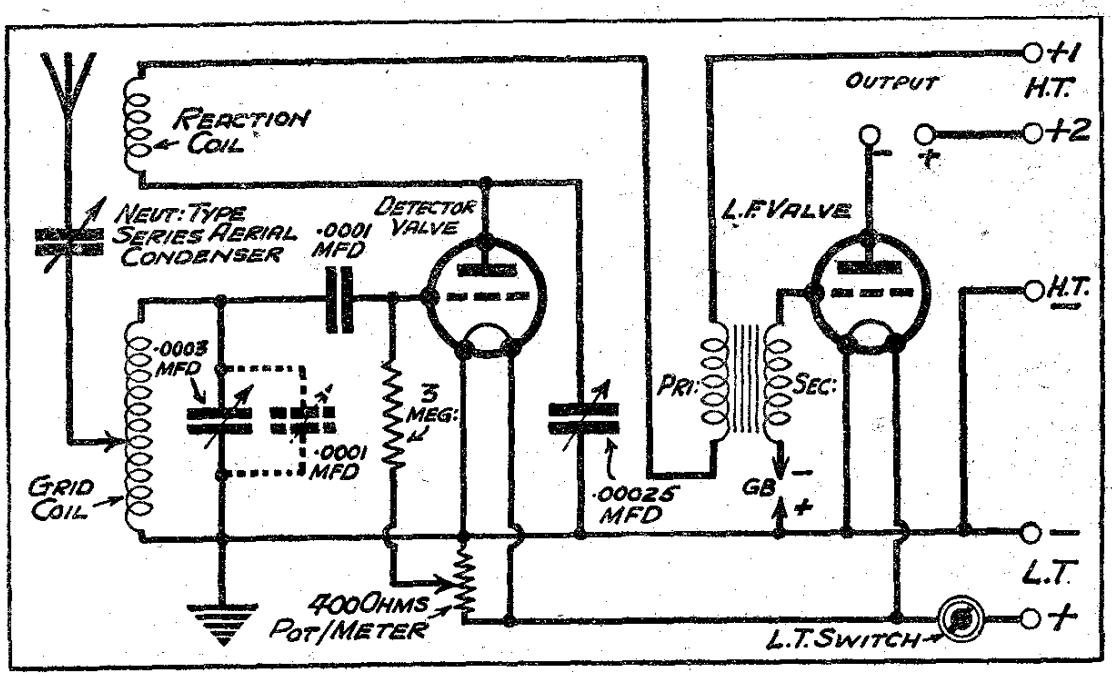
Above is a CIRCUIT No. 14, a very selective "Det.-L.F." circuit for Regional areas. It has many refinements. Note particularly the detector-grid potentiometer, panel light, and flexi-coupling arrangements, details of which are given with Circuit No. 8.



CIRCUIT No. 15. An ideal arrangement for the short-wave enthusiast embodying all the necessary refinements for successful long-distance reception. Use a 4-turn plug-in short-wave coil for the grid coil, and a 4- or 6-turn coil for reaction. The ·0001-mfd. variable condenser, shown dotted in parallel with the main tuning condenser, is optional, but greatly helps when tuning-in elusive distant stations.

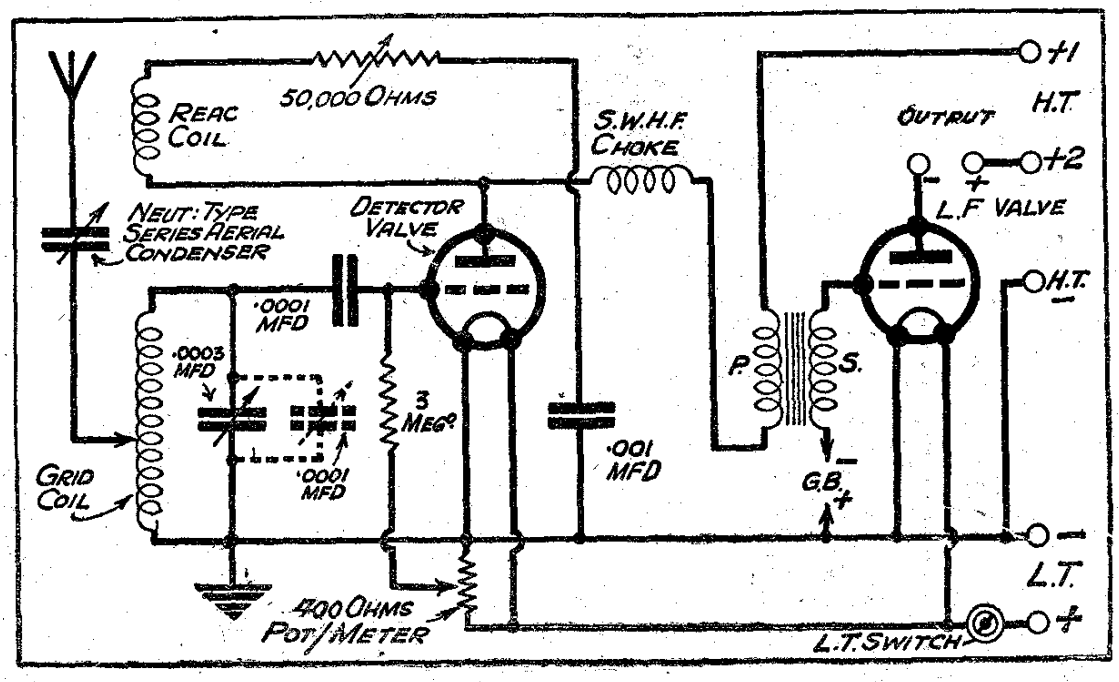
CIRCUIT No. 16 shows how the "Wireless Constructor" "Explorer" coil can be used in conjunction with an Extenser. This is a very popular dual-range two-valver, giving excellent loud-speaker results at moderate distances from the local station. The compression condenser should be adjusted for best results in your particular locality.

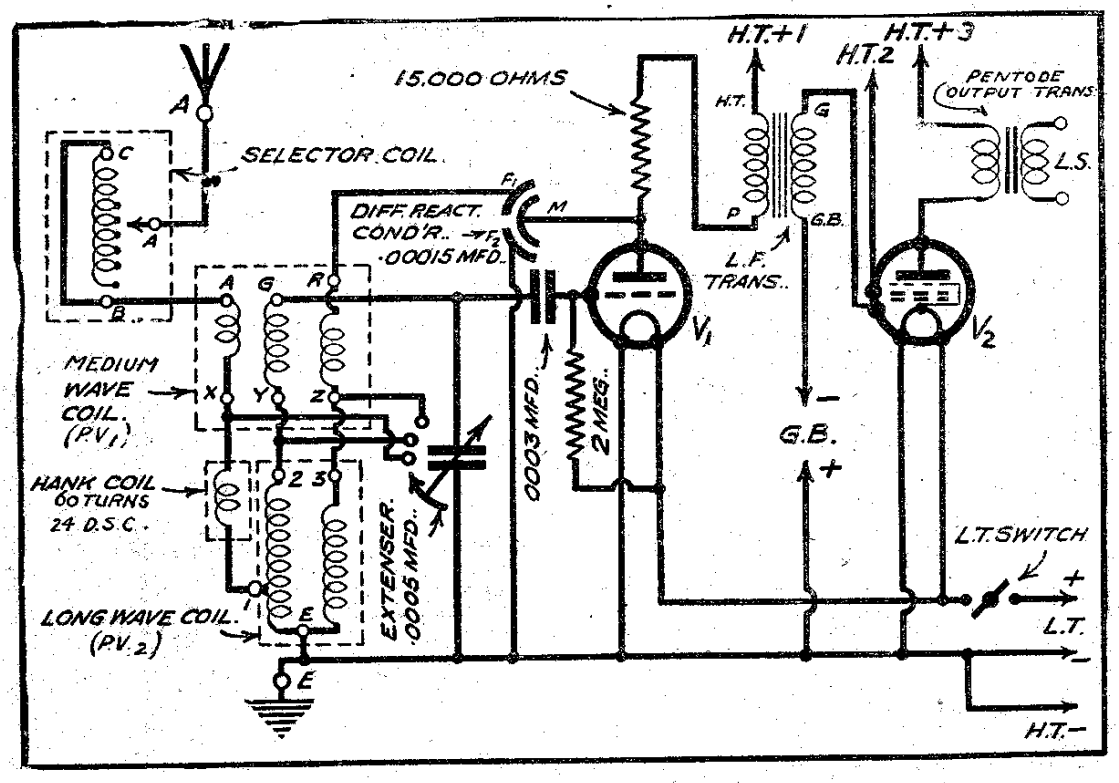




CIRCUIT No. 17. An excellent two-valve short-wave receiver on the same general lines as Circuit No. 15. In this set, however, the reaction arrangements are different, and it will be noticed that the H.F. choke has been omitted. By connecting the moving vanes of the reaction condenser to earth, as shown here, the set is almost entirely free from reaction hand-capacity effects.

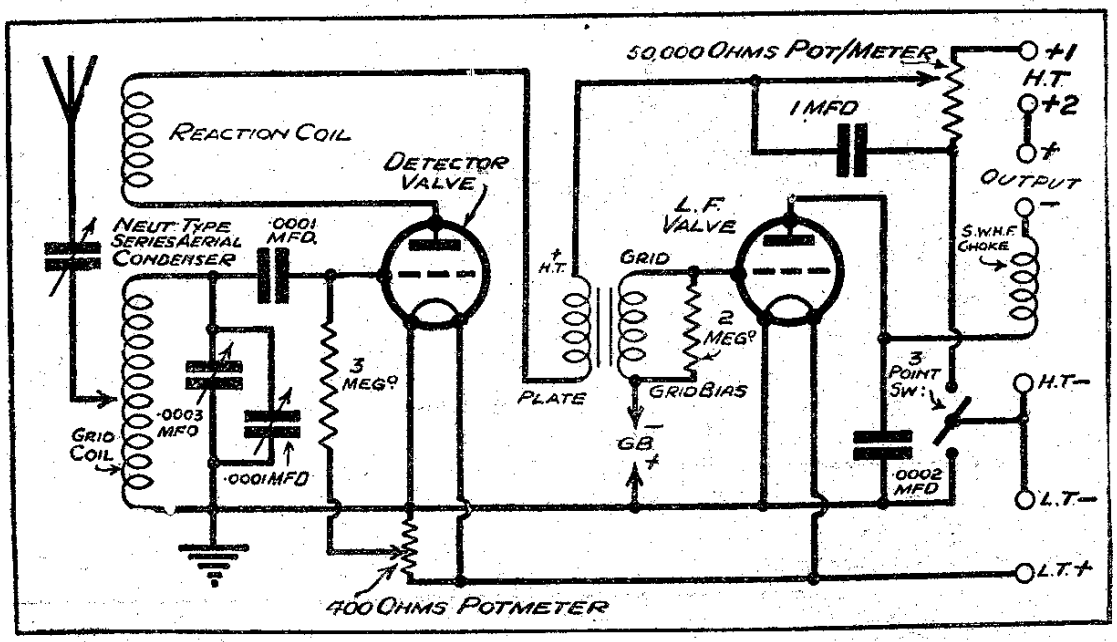
CIRCUIT No. 18. Still another efficient variation of the arrangement shown in Circuit No. 15. The 50,000-ohm variable resistance (which should be of the wire-wound variety) in series with the reaction coil gives wonderfully smooth control of reaction, and hand-capacity effects are almost negligible. For best results the potentiometer slider should be left as near to the positive end as is consistent with smooth reaction control.

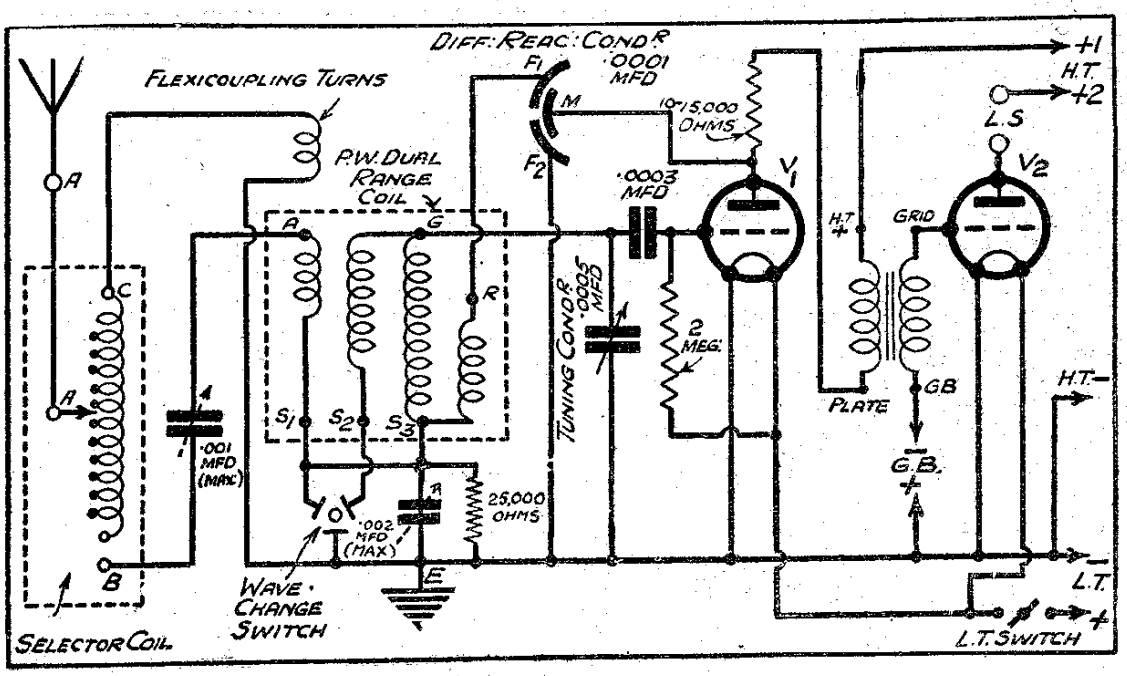




CIRCUIT No. 19. Selectivity, automatic wave-changing and high-quality loud-speaker reproduction of the local programmes are the principal features of this popular "Det. and Pentode" arrangement. The slider arm of the selector coil should be varied for best results on the medium broadcast band, but on long waves it should be left set on the end stud B.

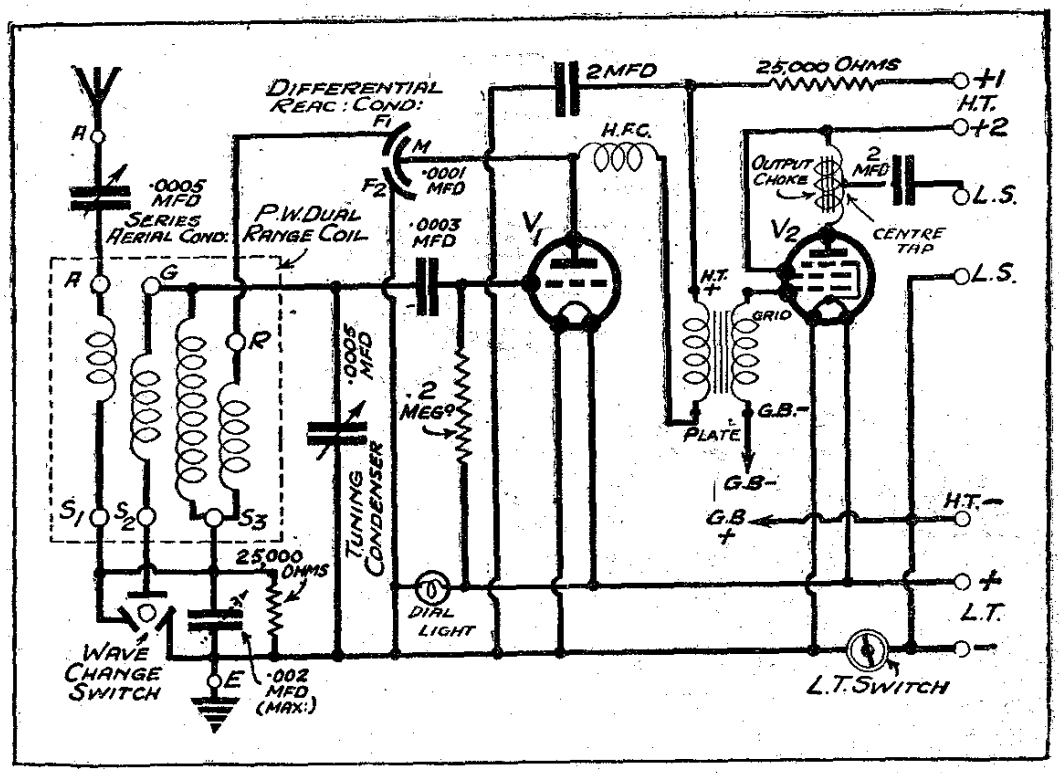
CIRCUIT No. 20. This is a useful example of a resistance-controlled reaction circuit specially intended for the short-wave long-distance enthusiast. The 50,000-ohm potentiometer carries the H.T. current for the detector valve, and must therefore be of the wire-wound variety. Note also the three-point on-off switch which prevents the H.T. from discharging through the potentiometer when the set is switched off.

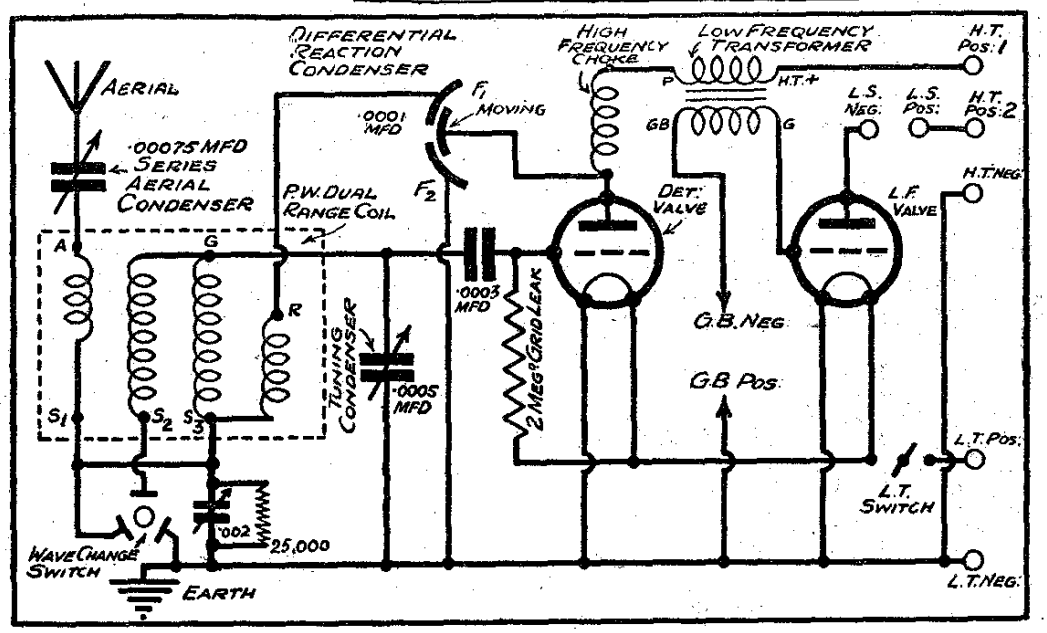




CIRCUIT No. 21. A two-valve wave-change circuit with a high standard of selectivity suitable for use in Regional areas. The degree of selectivity can be varied by altering the number of flexi-coupling turns round the dual-range coil, but in most cases two or three turns will be adequate. The method of using flexi-coupling turns is the same as in Circuit No. 8.

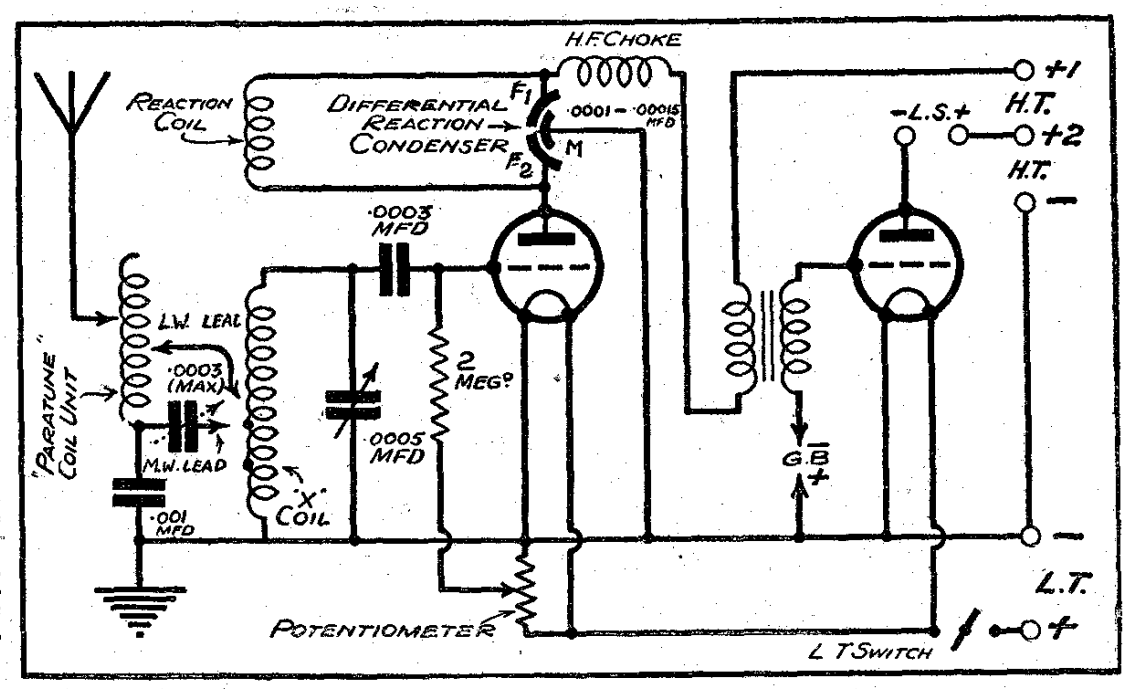
CIRCUIT No. 22. A high-efficiency dual-range two-valver with pentode output valve. This receiver is particularly suitable for the man who wants slightly more volume than is given by the standard two-valve arrangement. The detector de-coupling and output filter circuits contribute to the high quality of reproduction obtainable with this popular two-valver. It is important that the output choke should be of the type specially intended for use with a pentode valve.

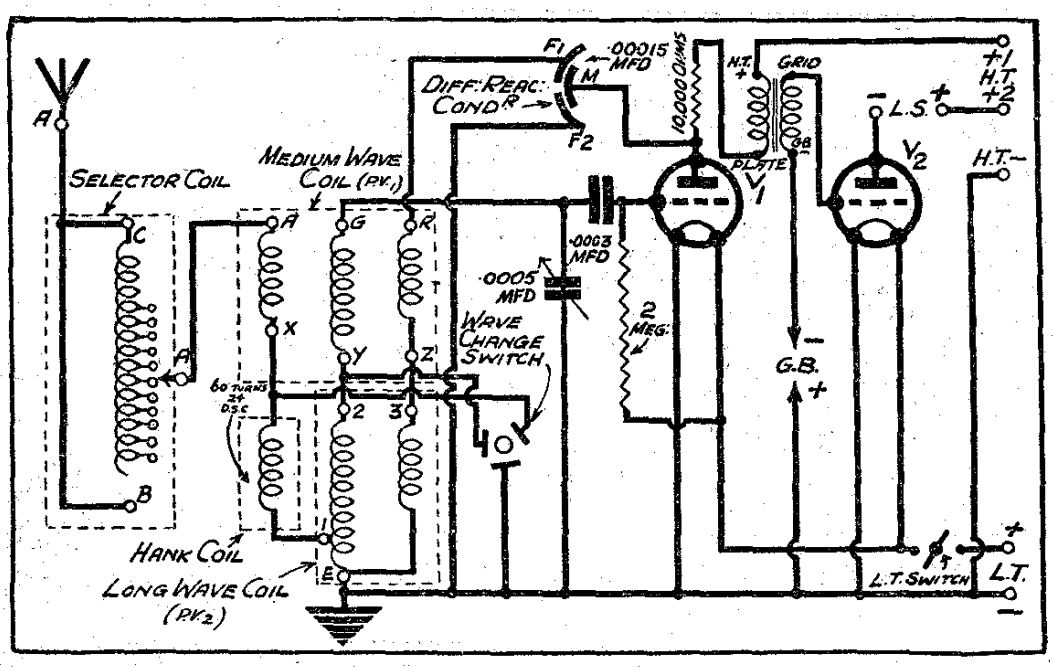




CIRCUIT No. 23. A cheap-to-make two-valver employing the popular "P.W." dual-range coil. This circuit is on the same general lines as the one above, but shows how the output should be arranged when it is not desired to use a pentode valve. On long waves the ·002-mfd. compression condenser (the one with the 25,000-ohm resistance across it) should be varied for best results.

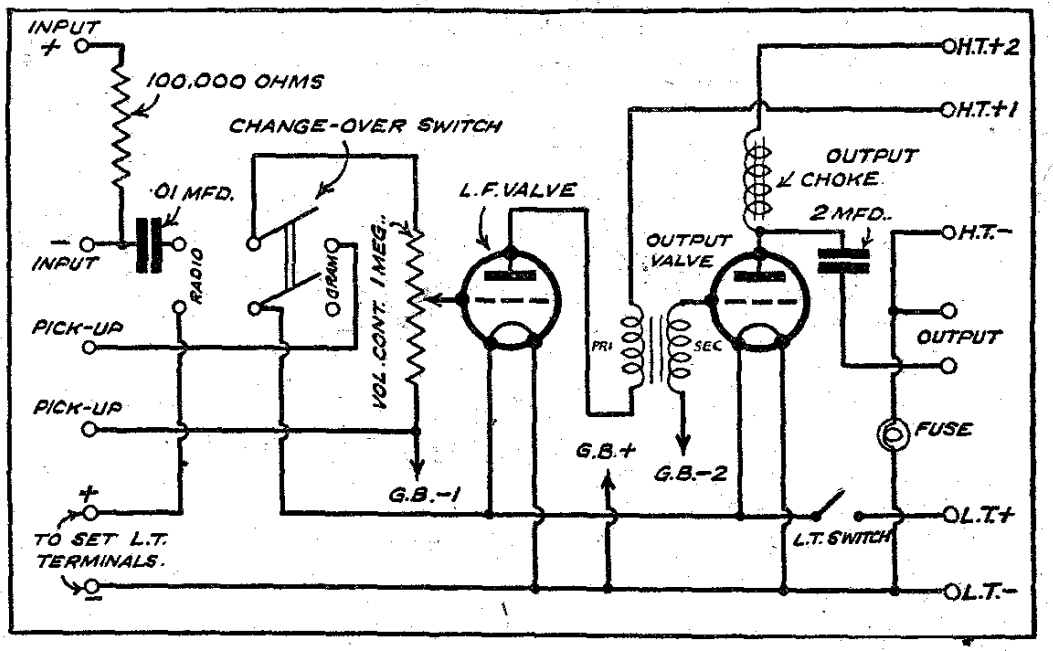
CIRCUIT No. 24. This receiver employs the "Wireless Constructor" "Paratune" scheme. On medium waves lead marked "M.W." should be joined to one of the terminals on No. 60X coil, and Paratune slider should be adjusted on every station. For long waves use No. 250X coil, join L.W. lead to terminal on "X" coil and other end of lead to tap on "Paratune" coil. Then have "Paratune" slider set for elimination of "break-through." Reaction coils should be No. 40 for medium waves, and No. 100 or 150 for long waves.

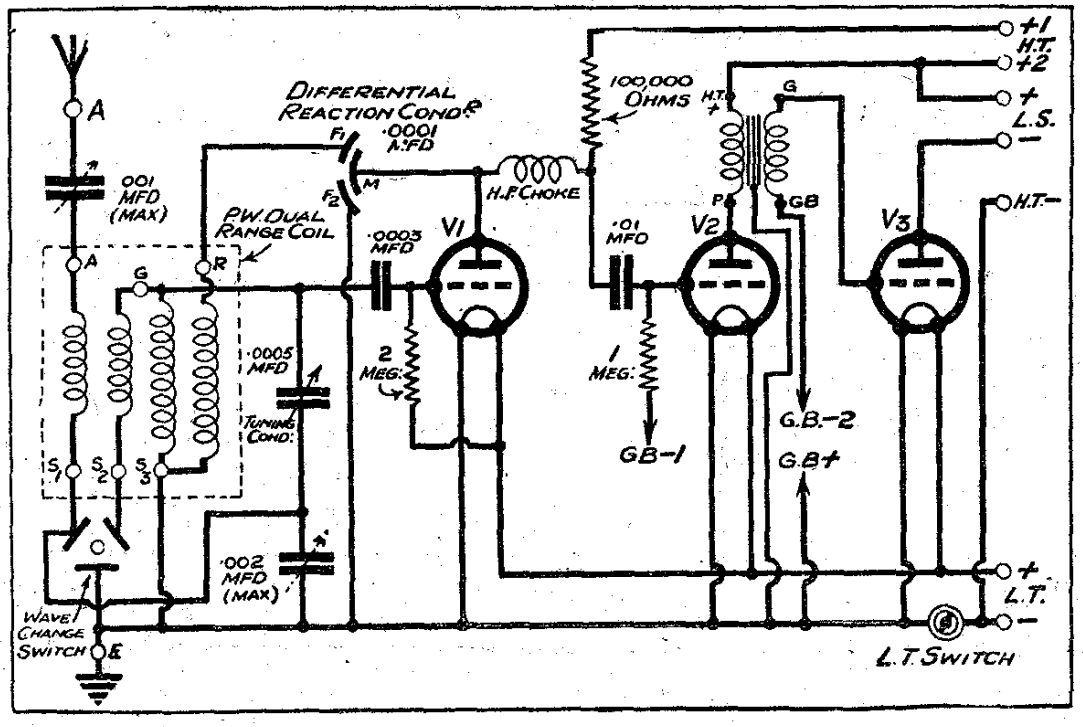




CIRCUIT No. 25. Specially designed to enable distant stations to be heard in Regional areas. The inclusion of selector coil not only enables a high degree of selectivity to be obtained, but gives a noticeable improvement in signal strength on distant transmissions. On long waves, the selector coil slider arm whould be set on stud B.

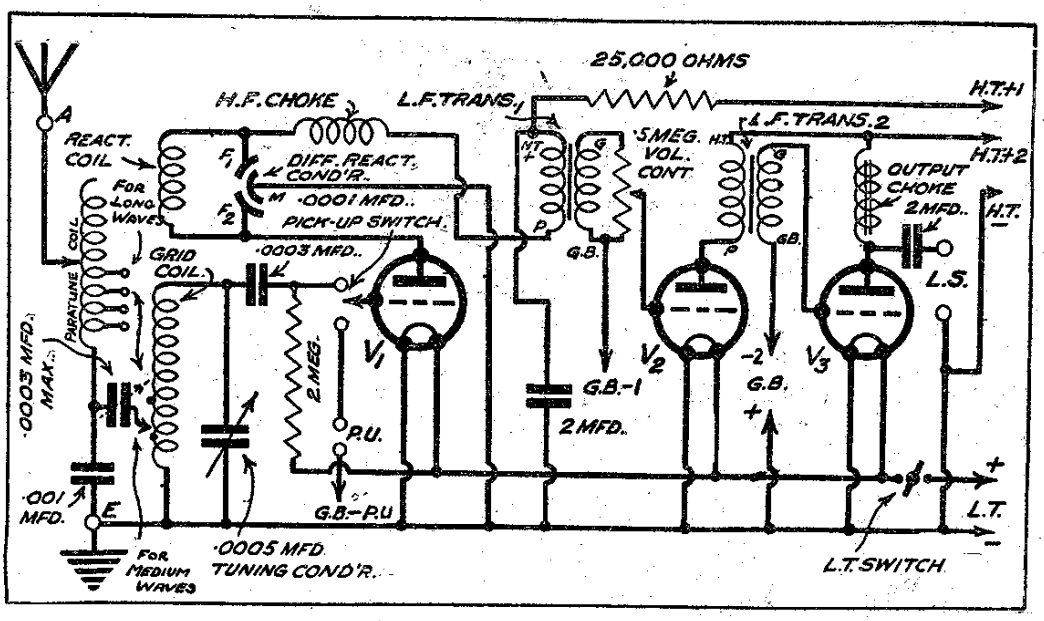
CIRCUIT No. 26. An up-to-date two-valve low-frequency amplifier for radio or gramophone use. This amplifier is designed for use after any crystal set or valve set which has no L.F. stages already in use. When the change-over switch is in the "gram" position for pick-up use, the L.T. to the valves in the set is automatically switched off.

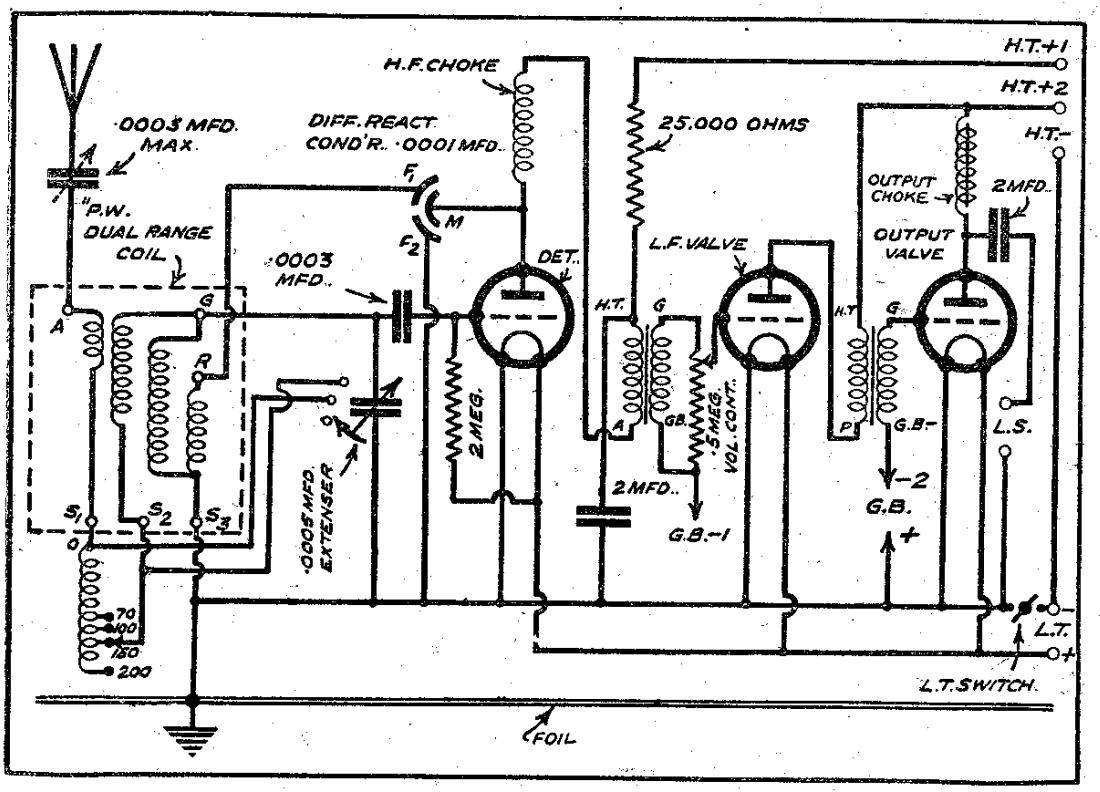




CIRCUIT No. 27. A straightforward "detector and two L.F." receiver of the general-purpose type, capable of powerful signals on the local station. Providing you are not too close to a regional transmitter, this circuit will also give quite a number of distant stations on the loud speaker. Selectivity can be adjusted by varying the .001-mfd. max. compression condenser.

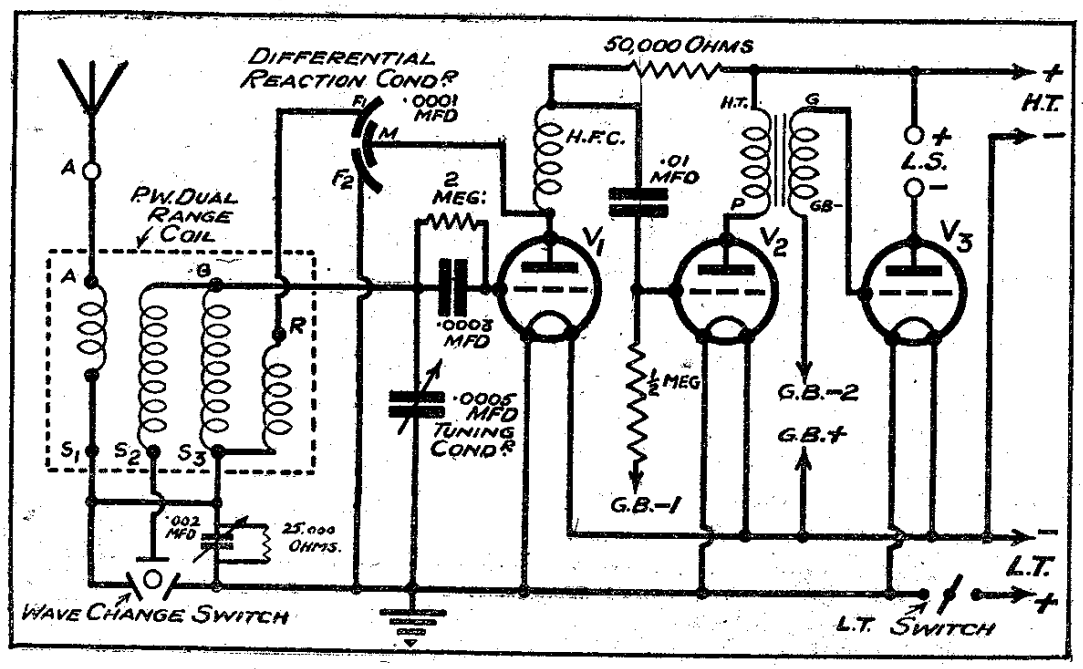
CIRCUIT No. 28. A very powerful receiver with high selectivity and plug-in coils. The coils should be a No. 60X for the grid coil and a No. 40 or 50 for reaction on medium waves, and a No. 250X and a No. 100 or 150 for long waves. The "Paratune" coil scheme which is used in this receiver is described in connection with Circuit No. 24. One of the several interesting features in this set is the change-over switch, which enables a gramophone pick-up to be used when desired.



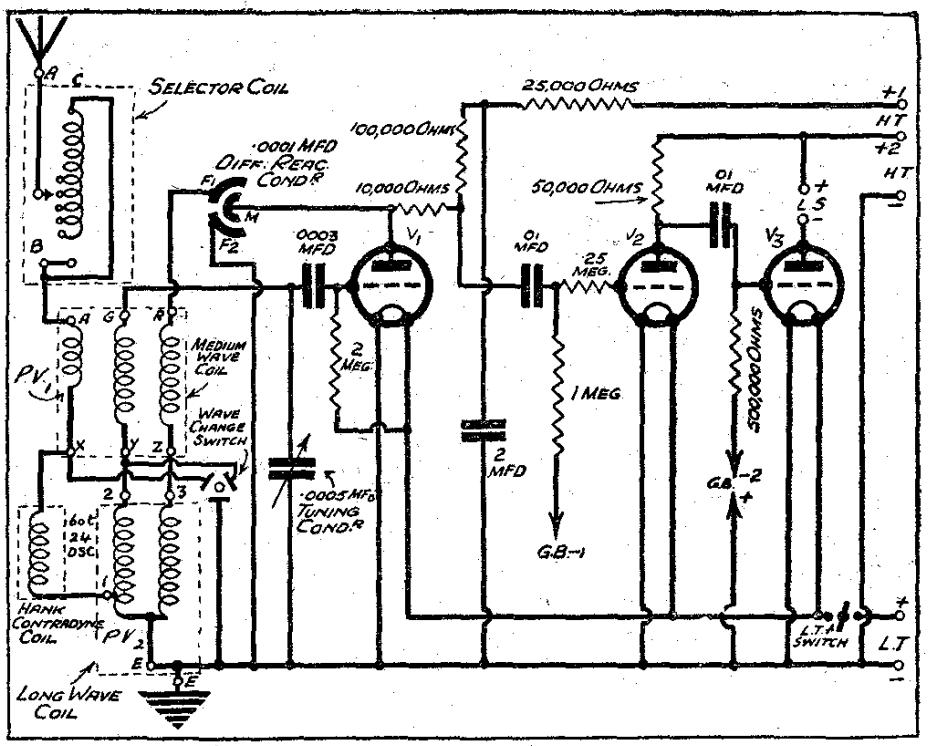


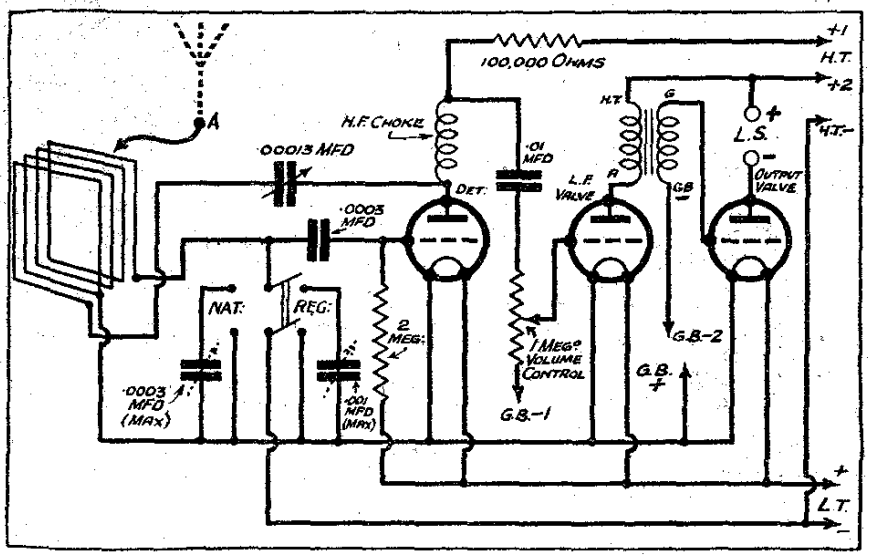
CIRCUIT No. 29. Automatic wave-changing from medium to long waves is the attractive feature of this loud-volume three-valve receiver. Special precautions have been taken in the design of this set to avoid medium-wave "break-through" when the receiver is in use on long waves. All the necessary de-coupling devices to ensure absolute stability on the low-frequency side are included in this design.

CIRCUIT No. 30. This is a particularly economical arrangement of the popular "detector and two L.F." combination of three valves, which gives high-quality reproduction with ample volume for all normal domestic requirements. A common H.T. positive terminal supplies all three valves, and the correct voltage on the detector valve is obtained by means of a 50,000-ohm coupling resistance.

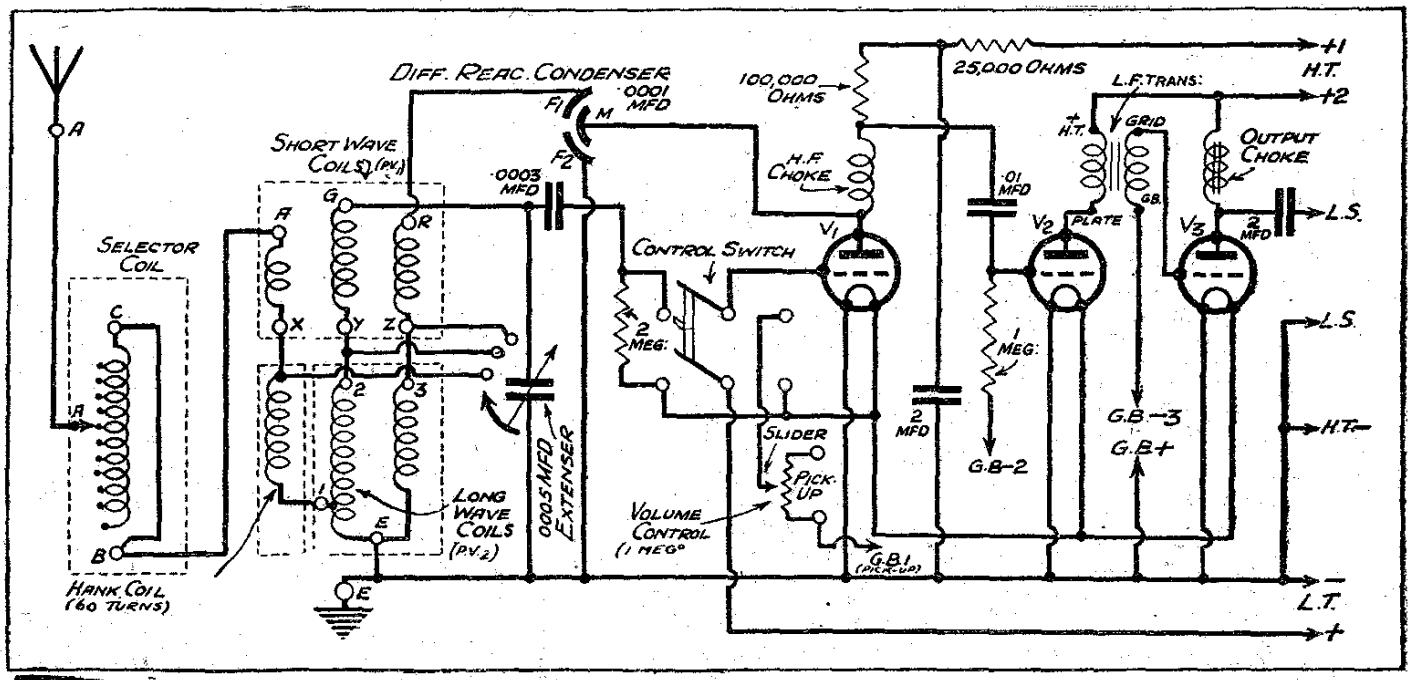


CIRCUIT No. 31. Superb quality of reproduction with a high degree of selectivity are the outstanding features of this receiver. Notice among the many interesting refinements the hank contradyne coil which dispenses with the annoying phenomenon of medium-wave "break-through" on long waves. In order to keep cost down the resistances in the anode circuits of the first two valves can all be of the "spaghetti" type. Note the ·25-megohm grid leak in series with the grid lead of the first L.F. valve. This serves as an H.F. stopper and helps to ensure absolutely perfect stability on the L.F. side.

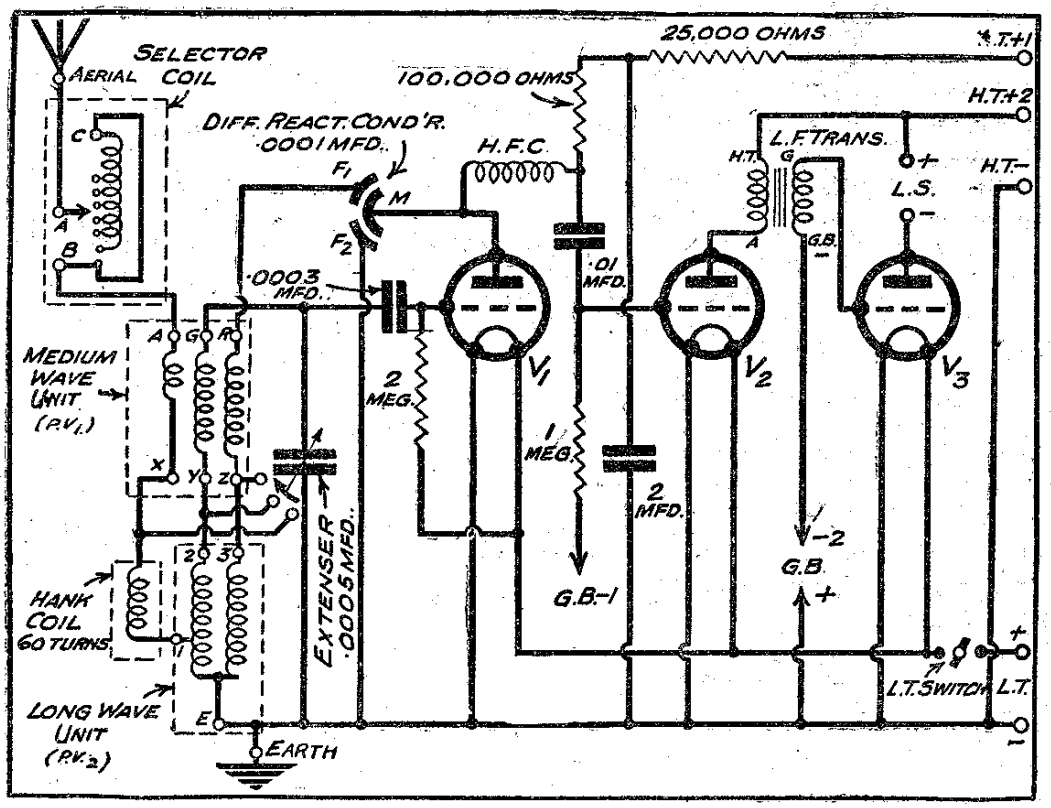




CIRCUIT No. 32. This circuit has been specially designed for use in regional areas where an outdoor aerial is not possible. The automatic station-change switching is so arranged that when the switch arm is in the neutral position the set is switched off. Tuning is done with compression condensers, one of which should be adjusted to the regional programme and the other to the National. Frame can consist of 20 turns of No. 24 D.S.C. on 2-ft. square framework, with earth tap at 14 turns from grid end.

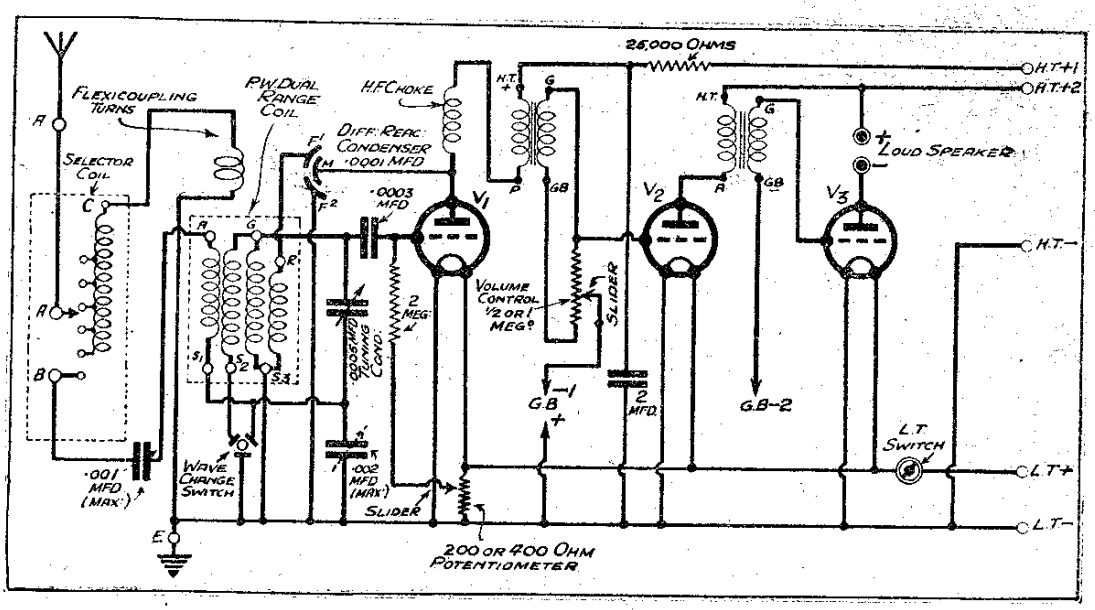


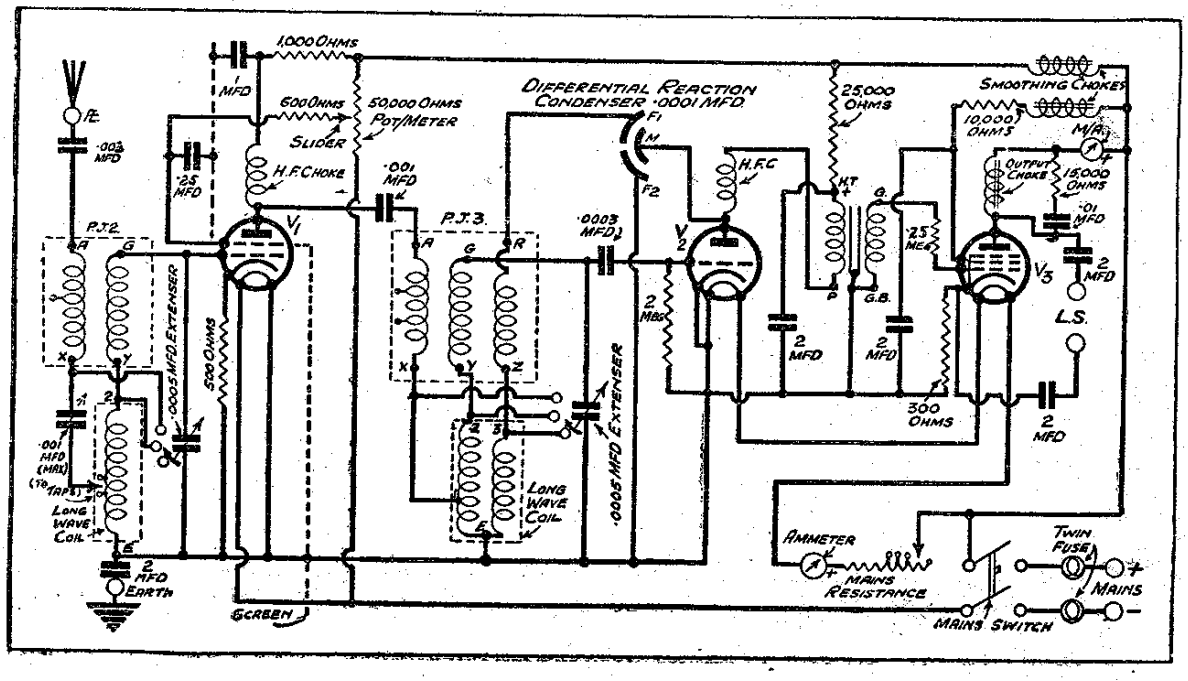
CIRCUIT No. 33. A de-luxe radio-gramophone receiver representing the very last word in modern three-valve receiver design. The main features are high selectivity and long-range, automatic wave-changing, and radio-gramophone change-over switch, with volume control for pick-up.



CIRCUIT No. 34. An efficient and sensitive dual-range receiver on the same general lines as Circuit No. 33, but omitting the radio-gramophone switch and the output filter. Note how the connections to the Extenser are so arranged that the medium-wave interference remover is automatically shorted out when the set is on the medium broadcast band. This "remover" is a hank coil of 60 turns of 24 D.S.C. wire wound on a former about 2 in. in diameter, which is afterwards removed.

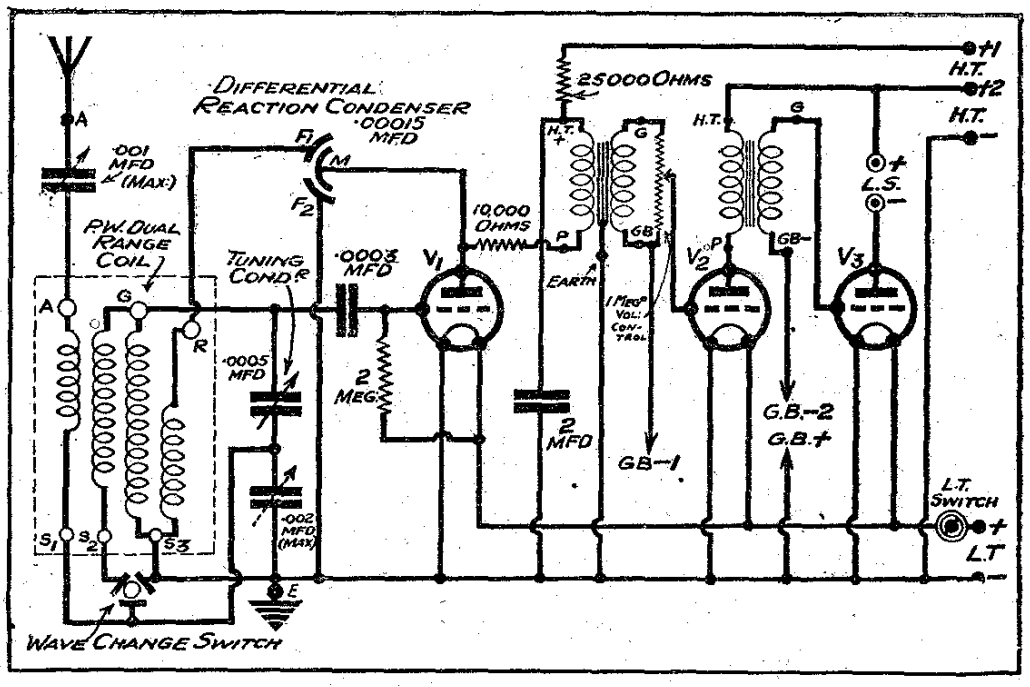
CIRCUIT No. 35. A specially powerful dual-range receiver for use in regional areas where a high standard of selectivity is imperative. The correct number of turns for the flexi-coupling winding is governed by the size of your aerial and your distance from the local station, but in most cases two or three turns will be about right. Note the volume control, and detector grid-leak potentiometer for obtaining smooth reaction.

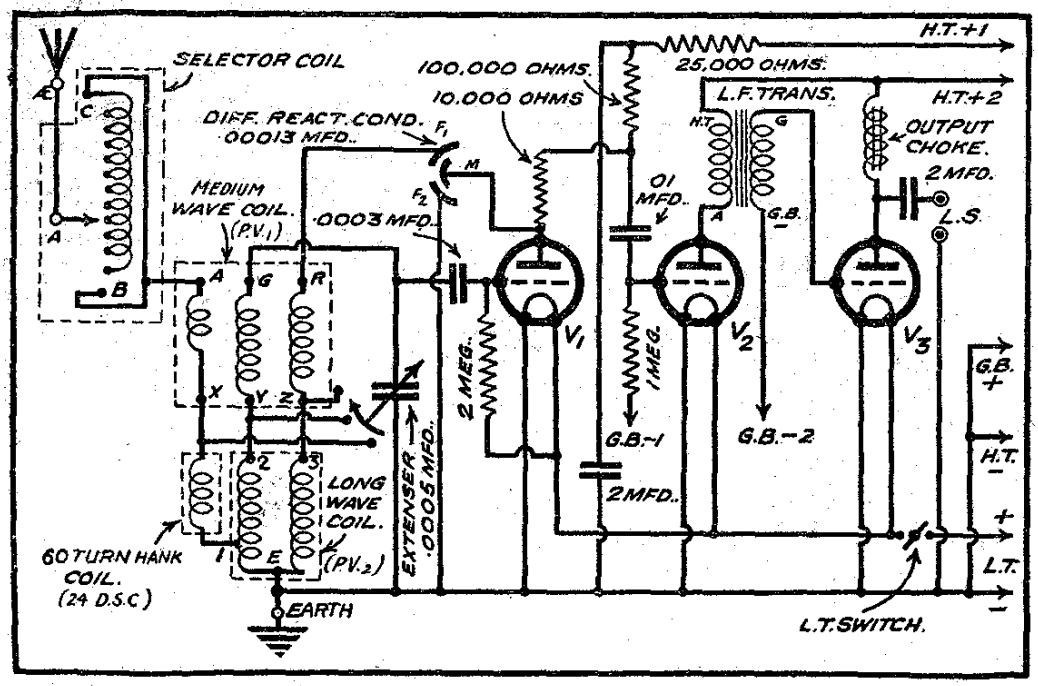




CIRCUIT No. 36. This super-efficient three-valver is worked entirely from D.C. mains. It employs the new indirectly-heated D.C. valves, and gives results almost equal to many four-valve sets of battery-operated type. High selectivity, long range and automatic wave-changing are but a few of its outstanding features.

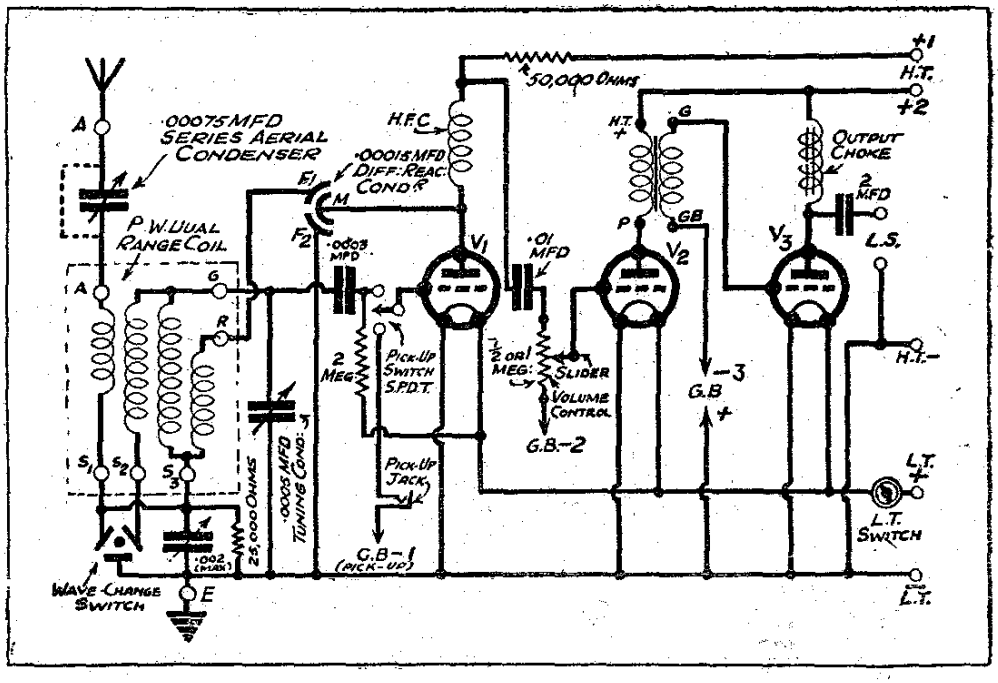
CIRCUIT No. 37. A three-valver based on the "P.W." dual-range coil, with two very powerful L.F. stages. A volume control is provided and in most cases for local station work it will be found indispensable. Note the use of a resistance in the anode circuit of the detector valve in place of the more usual H.F. choke. Selectivity can be varied by means of the ·001 - mfd. max. compression condenser in the aerial lead.

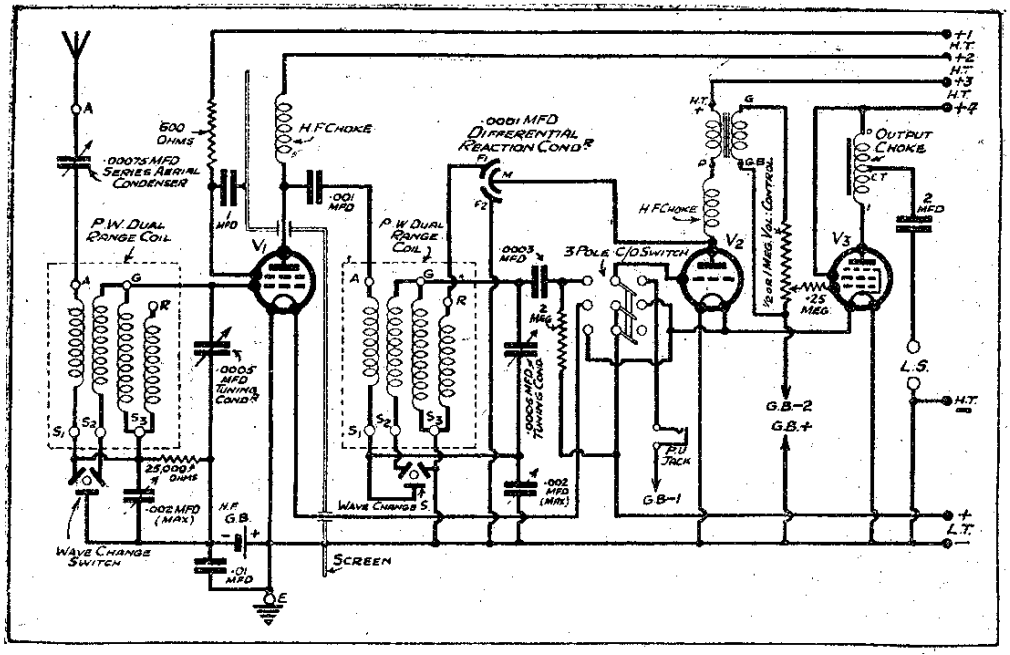




CIRCUIT No. 38. To anyone troubled with interference problems a receiver such as this with a selector coil aerial circuit is of particular interest. Unlike many arrangements, the selector coil method of obtaining high selectivity does not reduce signal strength. In fact, in most cases it actually gives louder volume on distant stations. This set is adequately de - coupled for use with an H.T. eliminator.

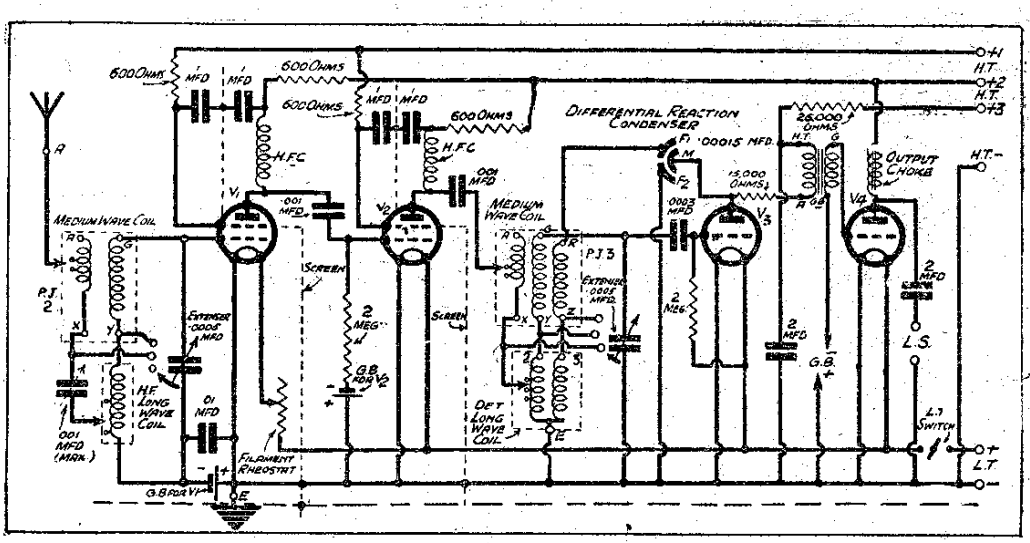
CIRCUIT No. 39. This receiver is another example of a three-valver suitable for use with either H.T. batteries or a mains unit. It is chiefly intended for use in districts outside a radius of 20 miles from the local station. Note the inclusion of a change-over switch for instantly converting the set into a gramophone amplifier. The volume control is effective on both radio and gramophone programmes.

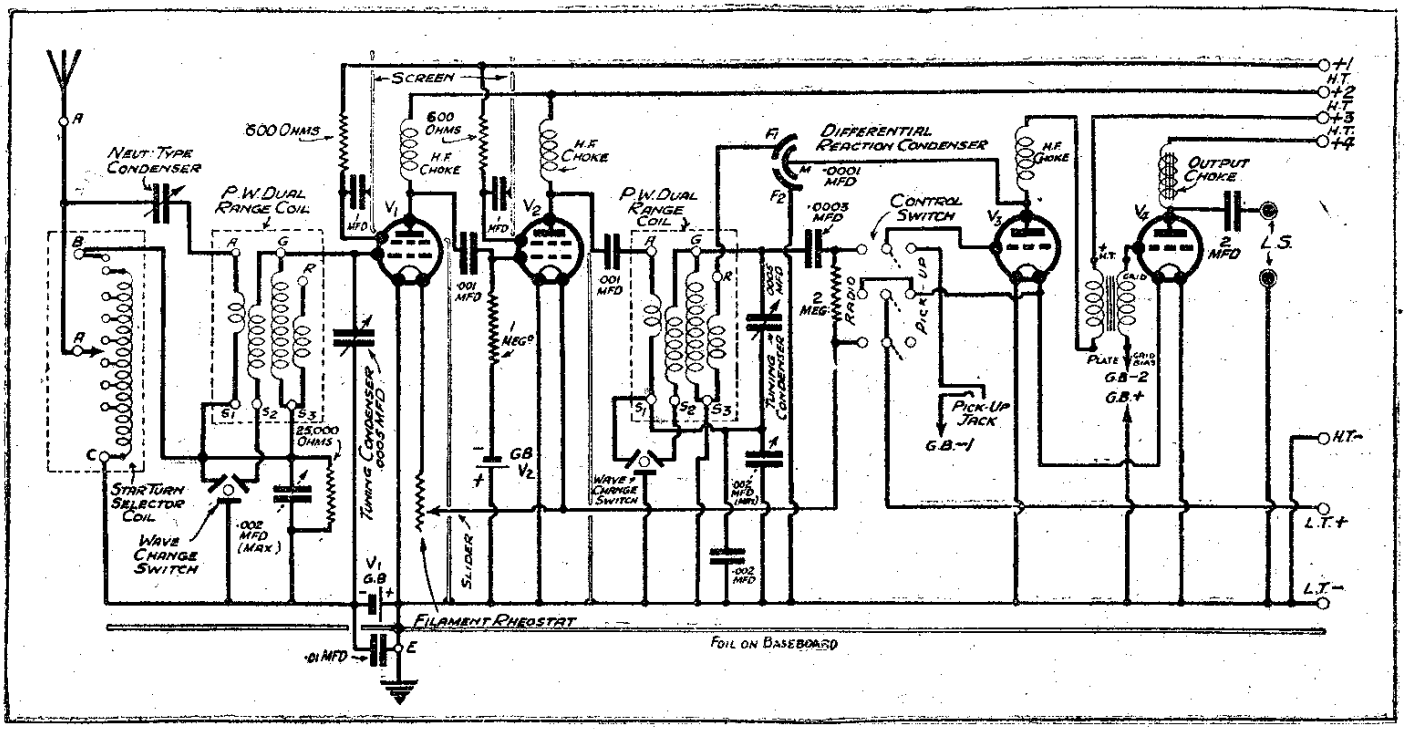




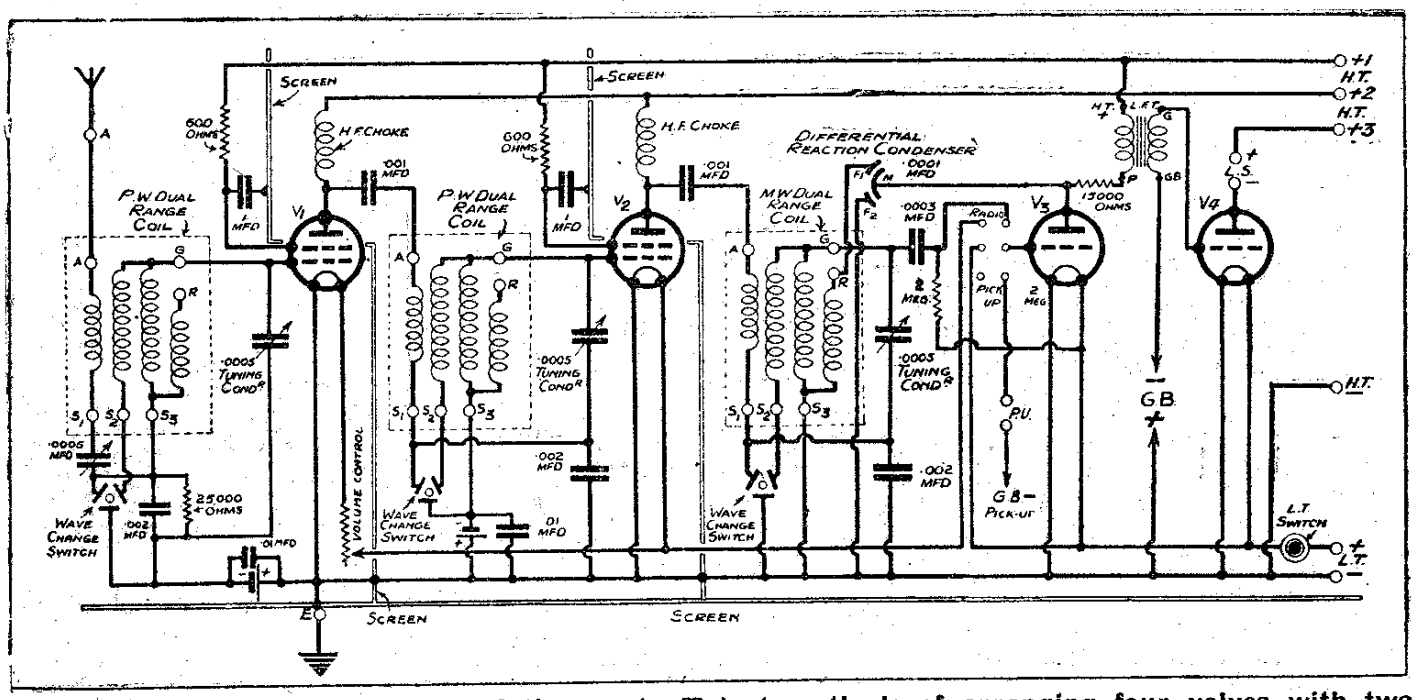
CIRCUIT No. 40. Specially intended for long-distance reception on the loud speaker and employing the popular combination of S.G., H.F., detector and pentode output. This high-efficiency receiver is also provided with a radio-gramophone switch which automatically cuts the H.F. stage out of circuit when the pick-up is in use. A volume control is included which is operative on both radio and gramophone.

CIRCUIT No. 41. A super long-distance receiver, designed on the most up-to-date principles and employing automatic wave-changing. Note particularly the way in which the two S.G. H.F. valves are coupled to enable the number of tuning controls to be kept down to two. Both long-wave grid coils are 150 turns of 30 D.S.C. wire on coil quoits, the reaction winding being 50 turns; 30 and 60 turns from the earth end would be suitable grid-coil taps.



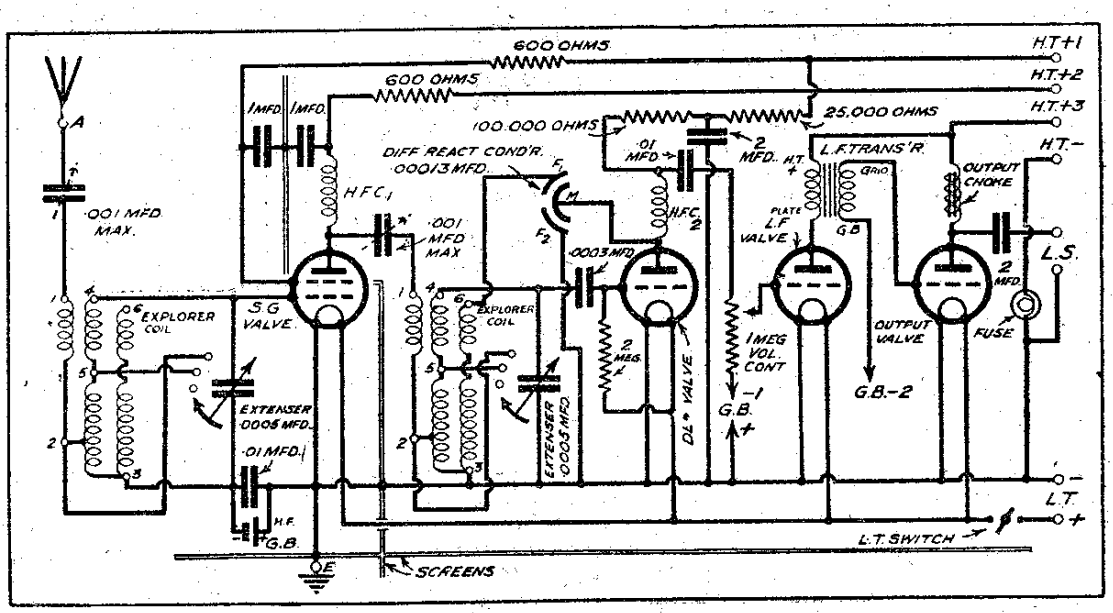


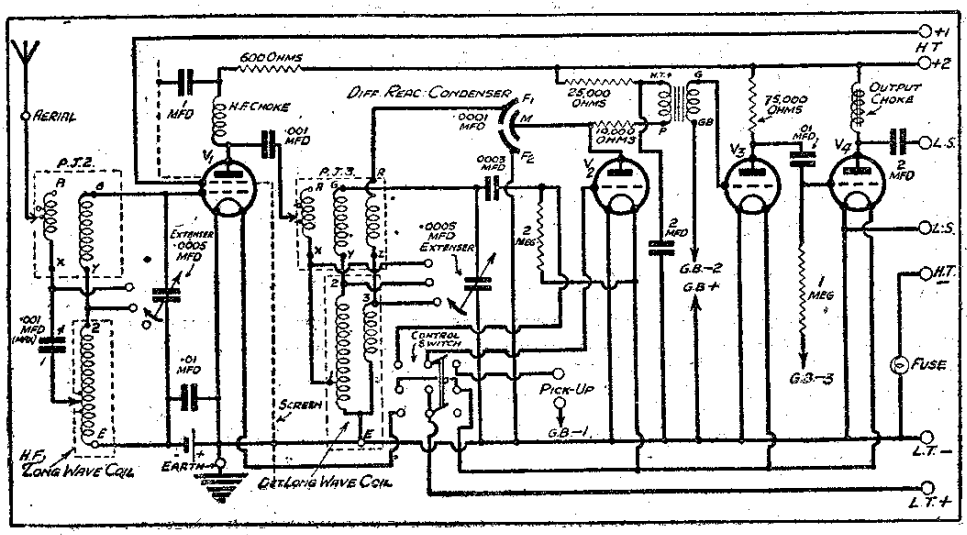
CIRCUIT No. 42. A highly selective and sensitive four-valve receiver, based on the "P.W." dual-range coil and incorporating several novel features. Note, for instance, the method by which the selector coil is coupled to the grid circuit of the first S.G. H.F. valve, the inter-stage screening between the two H.F. stages and the radio-gramophone change-over switch.



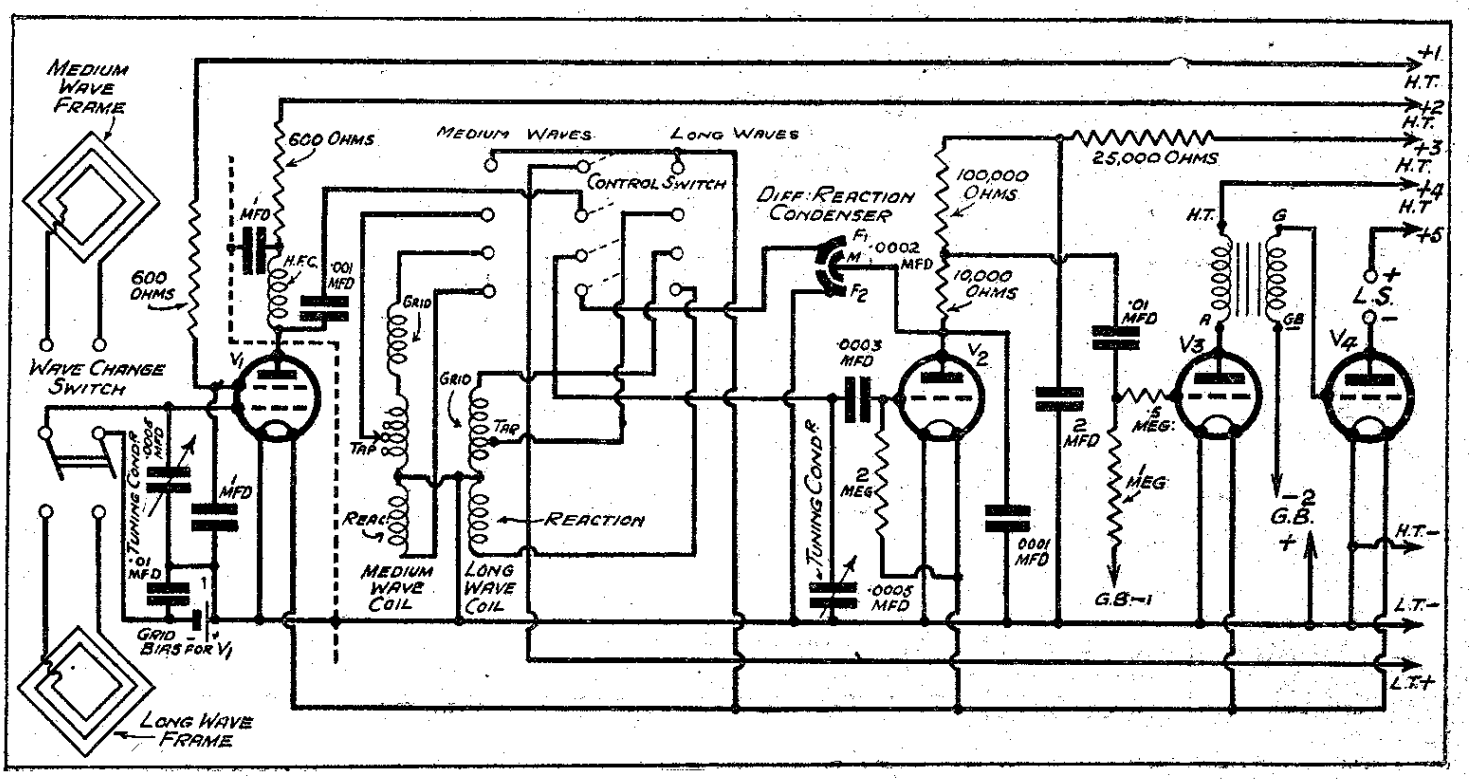
CIRCUIT No. 43 illustrates one of the most efficient methods of arranging four valves with two fully-tuned S.G. H.F. stages. This receiver has a remarkable loud-speaker range, and in addition to its outstanding merits as a long-distance radio receiver it is provided with a switch enabling the L.F. end to be used in conjunction with a gramophone pick-up.

CIRCUIT No. 44. This excellent four-valve receiver, employing Explorer coils and automatic wave-changing between medium and long waves, can be used with very satisfactory results on the ultra-short waves. It is only necessary to replace the present Explorer coils with Explorer short-wave coils, and tune with the Extensers between 100 and 200, and you should then be able to hear short-wave signals from all over the world.



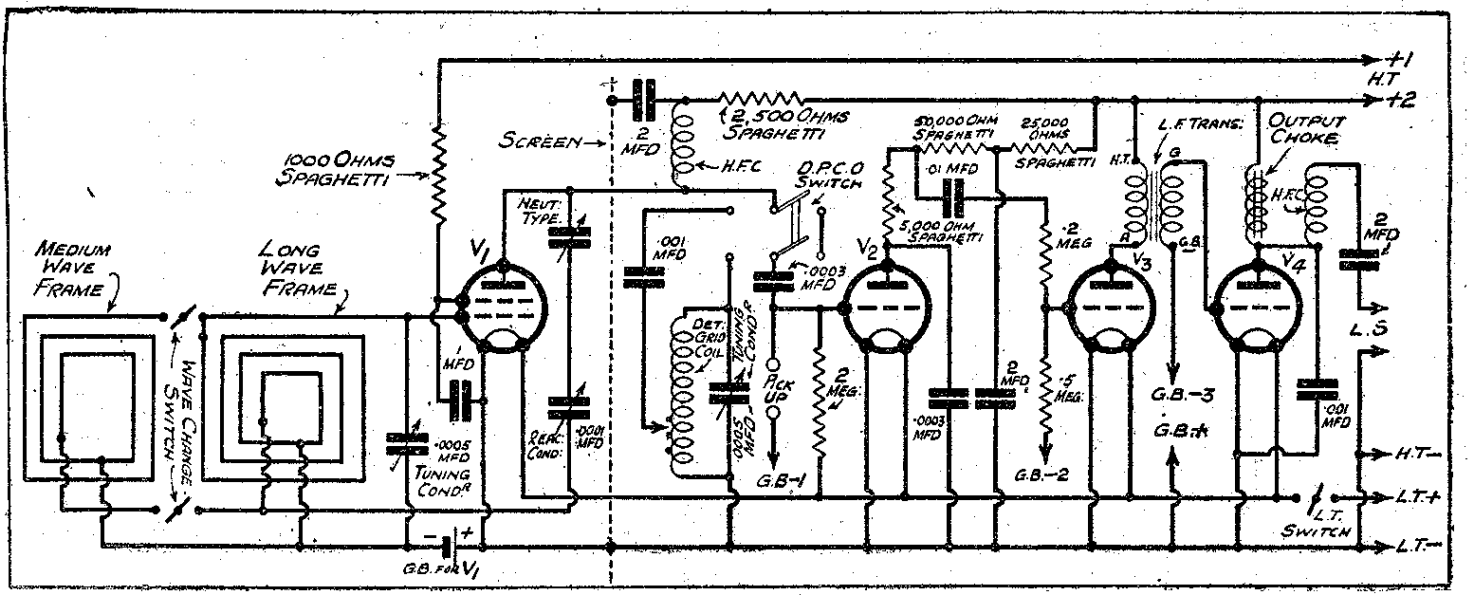


CIRCUIT No. 45. A magnificent receiver combining the attractive features of high selectivity, long-range loud-speaker results, superb quality and automatic wave-changing. The H.F. long-wave coil consists of 150 turns of No. 30 D.S.C., with tappings at 30 and 60 turns from the earth end. The detector long-wave coil is also wound with No. 30 D.S.C., and is exactly the same as the H.F. long-wave coil except for a 50-turn reaction winding, which should be put on the former first. Both these coils are wound on coil quoits.

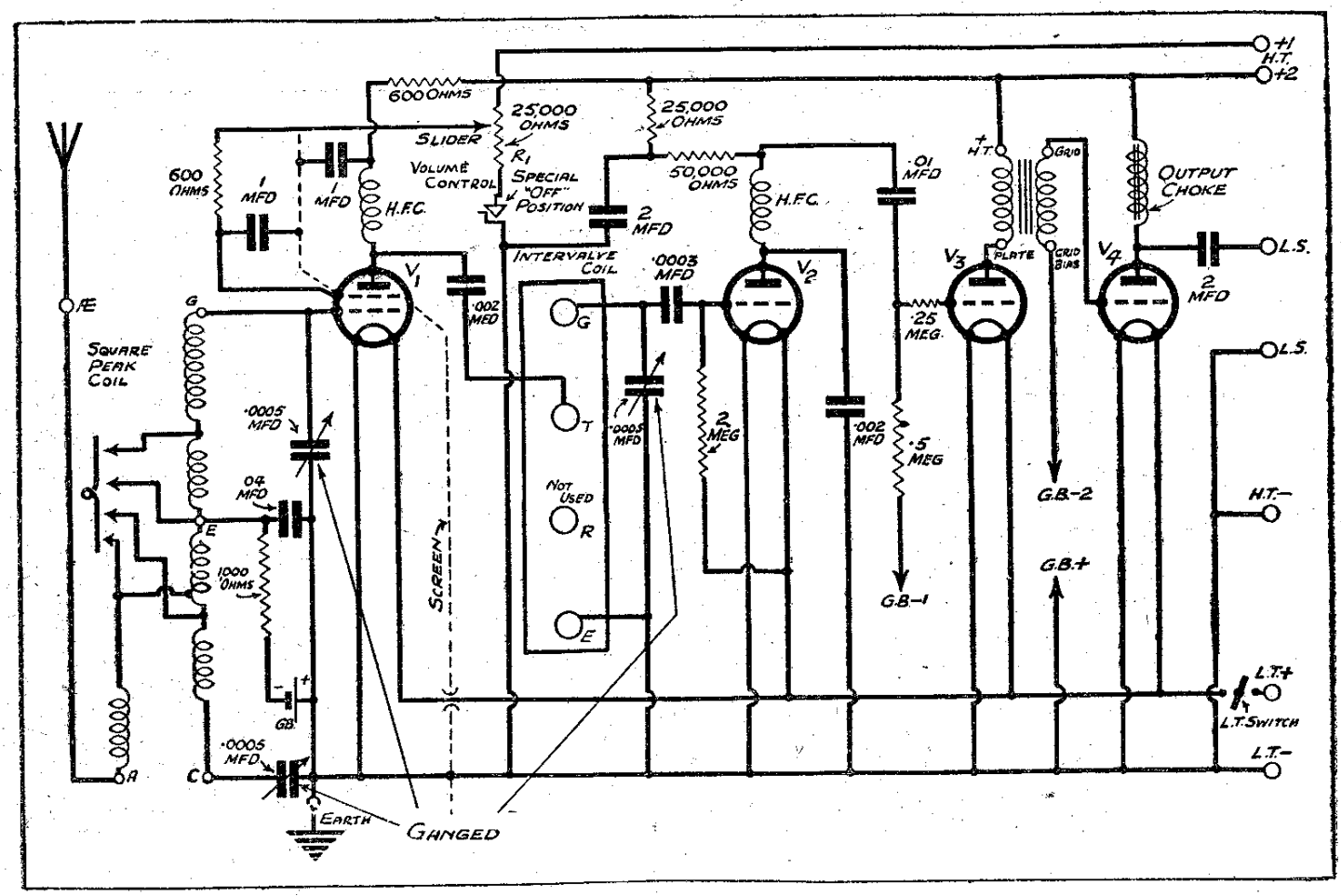


CIRCUIT No. 46. This wave-change portable circuit employs a complete change-over of coils when going from one broadcast band to the other. In the case of the frame aerials, the sizes of which depend upon the size of the lid of the cabinet in which the set is built, a simple double-pole change-over switch is effective. A four-pole change-over switch, however, is used for the intervalve coils, and this switch also serves the purpose of an on-off switch, the set being off when the switch is in its centre position. The coils are of the single-layer type, and can be constructed at home quite easily.

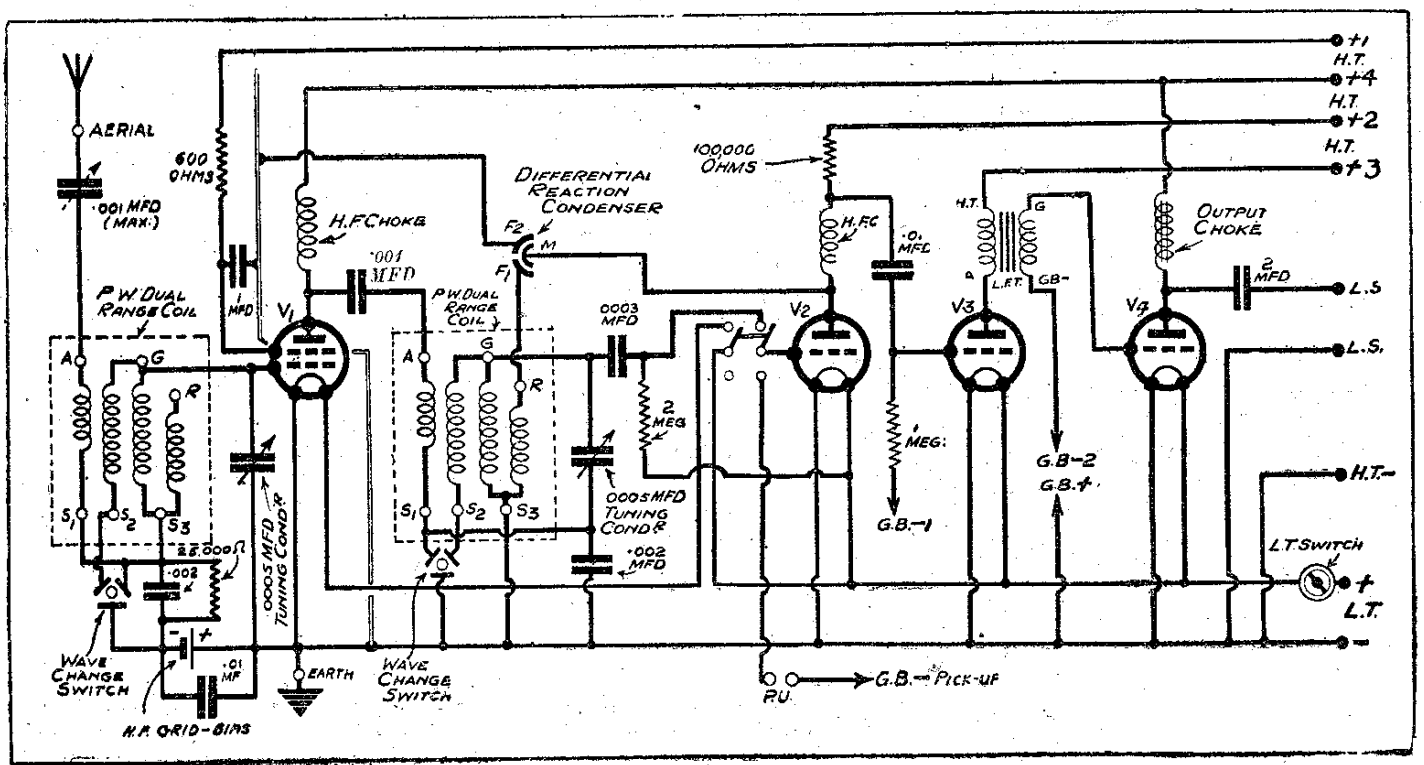
The medium-wave intervalve coil is made on a 2-in. diameter former 3 in. long, and is wound with 26 and 30 D.S.C. wire. Start with the 30 wire and put on 55 turns for reaction, then change to other wire and put on 40 turns in the same direction, making taps at the 10, 20, and 30 turns. Finish by winding on another 40 turns in the opposite direction because the coil is a binocular one. The long-wave coil can be wound on a coil quoit with some of the 30 wire. Put on 50 turns for the reaction and 150 for the grid coil, making a tap on the latter about 50 turns from its L.T. negative end. Experiments may prove necessary, however, to determine the best position of this tap.



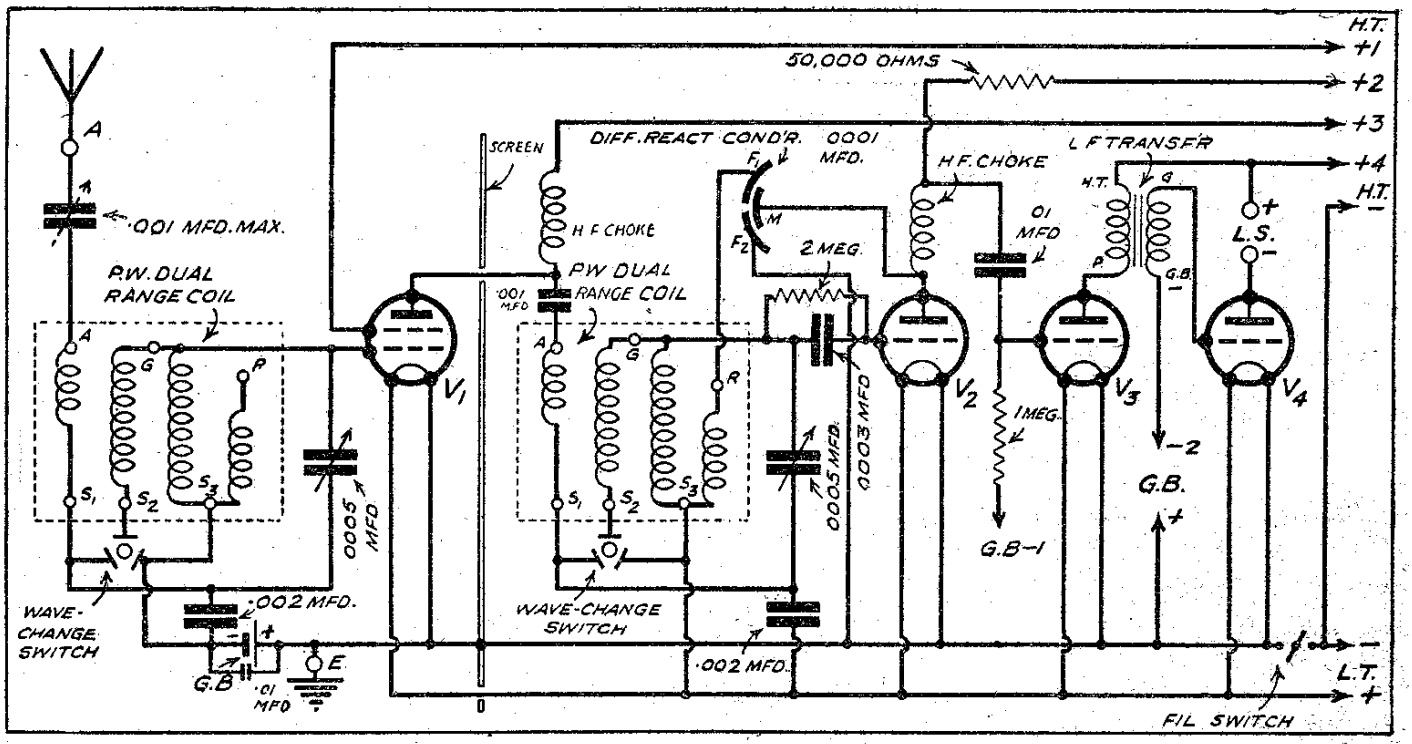
CIRCUIT No. 47. A simpler type of portable circuit on somewhat similar lines to circuit above. In this case the frame-aerial switching is obtained by putting the long-wave frame, which is permanently in circuit, in parallel with another winding for the medium waves. Here, again, the frame winding depends upon the size of the lid in which it is wound. In this circuit aperiodic coupling is used between the H.F. valve and the detector when working on the long waves. The medium-wave intervalve coil can consist of 64 turns of 30 D.S.C. wire on a 2-in. diameter former and tapped at 10, 20, and 30 turns from the end attached to L.T. negative.



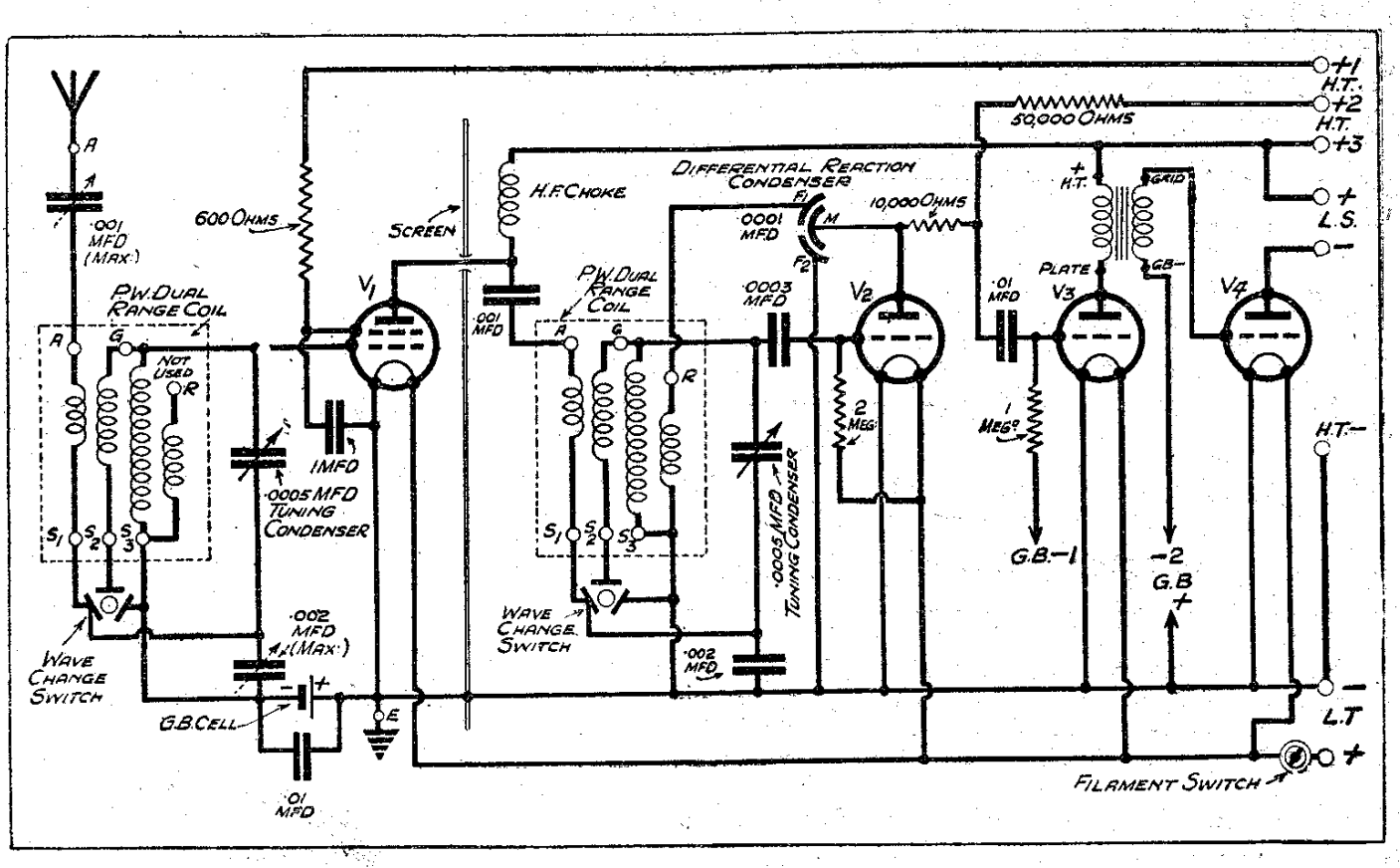
CIRCUIT No. 48. An efficient band-pass circuit without reaction, which employs a Varley Square-Peak band-pass coil for aerial tuning and a "Square-Peak" intermediate coil between the H.F. valve and the detector. Note that the potentiometer for controlling the voltage of the screening grid has a special "off" position to prevent a drain of current from the H.T. battery when the set is switched off. A separate on-off switch instead of the special automatic control on the potentiometer could be used. Experiments should be carried out with the voltage on H.T. plus 1 to find the best value.



CIRCUIT No. 49. Two "P.W." dual-range coils are used here, with interwave coupling for long waves in the case of the first one and Brookmans coupling for the second. The double-pole change-over switch in the centre gives radio when "up" and records when "down." For wave-change switches the correct ones to use are the "three-contact" type. The ·001 compression-type condenser in series with the aerial lead forms a convenient selectivity control for both long and medium waves, the smaller its capacity setting the greater being the selectivity.

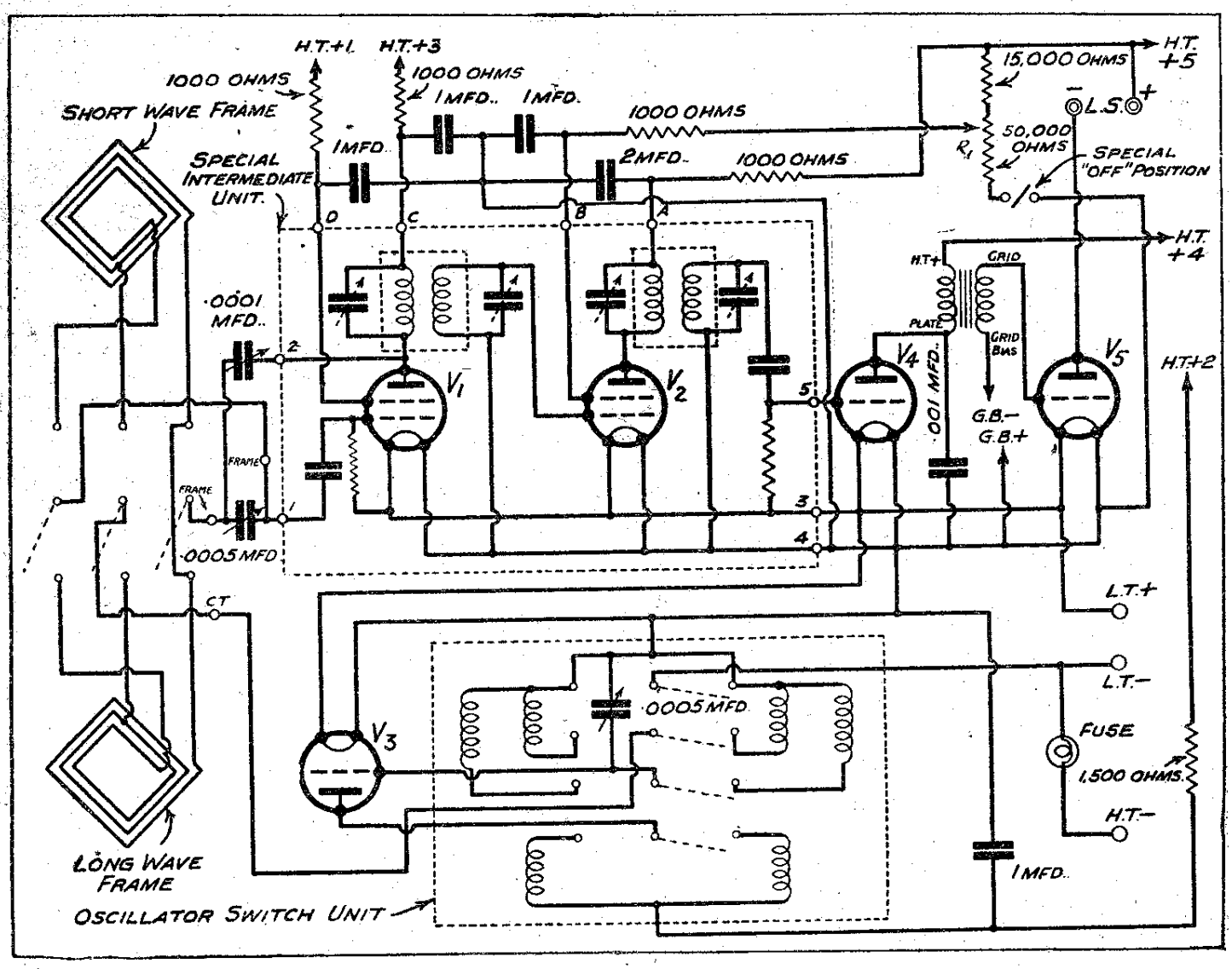


CIRCUIT No. 50. An extremely straightforward type of four-valve dual-wave-band circuit. Two "P.W." dual-range coils are utilised together with simple wave-change switches. The screened-grid valve is parallel fed via the primary of the second of the dual coils. A stage of resistance-capacity coupling and then one of transformer coupling follow the detector to provide the L.F. amplification. The ·001 variable condenser in series with the aerial lead is for purposes of selectivity adjustment, and its setting will naturally depend upon local conditions and the aerial with which the set is employed.



CIRCUIT No. 51. At first sight you might think this was the same circuit as the one above, but actually it differs in three ways. The object of showing this circuit as well as the one above is because it emphasises and illustrates in a remarkable way the usefulness of the Spaghetti-type of resistances for set simplification and economy. The first point where there is a difference is in the resistance in series with the screening grid of the S.G. valve for de-coupling purposes, and the use of three H.T. positive taps instead of four, made possible by ensuring a very high degree of H.F. stability. The second difference is in the use of a resistance in place of the H.F. choke in the plate circuit of the detector valve. Also, a variable long-wave coupling condenser is used in the first stage, which enables long-wave selectivity to be adjusted independently of medium-wave selectivity.

CIRCUIT No. 52. This is a good representative circuit of a type of set that has jumped very much into favour during the latter part of 1931. As you will probably recognise, it is of the super-heterodyne type employing a screened-grid valve in the intermediate position. It is largely due to the use of a screened-grid valve as an intermediate amplifier that the super-het. has again become popular, because it has made it unnecessary to have so many valves. It gives sufficient amplification without the use of two, three, or even four stages of intermediate amplification. Another interesting point about this circuit, which consists of first detector, intermediate amplifier, second detector, output valve and oscillator, is the use of a screened-grid valve as first detector. This, of course, greatly adds to the circuit's sensitivity by giving more amplification than a first detector of the ordinary three-electrode type. Yet another feature is the wave-change nature of the circuit. Complete change-over switches are provided for both the frame aerials and the oscillator coupler, and in the case of the former it may be incorporated actually in the frame aerial itself. The method of feeding the oscillations from the oscillator valve is a small coil coupled to the oscillator's grid coil and wired up to the centre-tap of the frame aerial.



So far as the practical conception of this circuit is concerned there are one or two points worthy of special mention. There are several firms now supplying intermediate transformers for super-hets. that are to employ screened-grid valves, and who also supply oscillator couplers which cover different wave-bands by means of switching. However, in this arrangement a special unit has been utilised so far as the intermediate valve and the first detector are concerned. It consists of an already-wired unit with holders to take the two transformers and also the two S.G. valves. (This particular unit is indicated by the components in the upper of the two dotted rectangles, all the components shown inside this dotted outline being incorporated in the unit.) The oscillator unit is shown enclosed in the lower dotted outline. A point to note is the special off position for the potentiometer that supplies the screening grid of the intermediate S.G. valve. If desired, an ordinary on-off switch can be used instead of a special switching arrangement on the potentiometer. Without switching at this point a continual discharge of H.T. would take place, whether the set was switched on or not.

MAINS CIRCUITS

Some useful notes on the subject of building up mains apparatus from circuit diagrams.

MAINS circuits, whether of all-mains receivers or mains units, are rapidly becoming a more and more important part of any publication dealing with radio. The attention of those fortunate enough to have mains is largely concentrated nowadays on such circuits, and for this reason we have grouped all the circuits that deal with mains radio apparatus together, so as to facilitate reference.

MORE CARE REQUIRED

Naturally, the production of a practical form of any mains circuit requires a little more forethought than the building up of a battery receiver from a theoretical diagram. In view of this we are giving on this page a few hints and tips on the subject of receiver design from circuit diagrams.

Of course, they are equally applicable to battery receivers, except in the cases of the few items which are specially concerned with mains work. Consequently this page will be found useful to anyone who intends constructing a practical form of one of the 77 efficient circuits contained in this booklet.

This article will be found of help when building any set up from a circuit, whether it be mains-operated or driven from batteries. It is therefore advisable to peruse it before starting construction.

First of all, having carefully chosen your circuit, collect together all the components that are required before deciding upon the size of baseboard and panel to use. It is as well to work out the layout before coming to a final decision on this matter.

The sequence of the components in the set can very well roughly follow that shown in the circuit, the H.F. components coming at the left-hand end of the panel and baseboard (looking at the set from the front), and the L.F. ones at the right-hand end. In the case of an all-from-the-mains receiver, group all the smoothing and rectifying apparatus at the most right-hand part of the set, and remember that many mains receivers require more screening than a battery set of the same type. This is, of course, largely due to the greater efficiency of mains valves.

ADHERE TO THE ORIGINAL

As regards the modification of circuits, this is not advisable except entirely as an experiment, for it must be remembered that all the circuits have been tried out in actual practice and are known to be satisfactory as a whole as they are shown. There is, perhaps, one exception to this, and it concerns circuits that employ a "P.W." dual-range coil and have what is termed Brookmans coupling for the long waves.

You can recognise these by the fact that in series with the tuning condenser there is either a fixed or a compression type condenser. It is, of course, shorted out when working on medium waves.

A good example of this is seen in Circuit No. 55, and if you turn to Circuit No. 53 you will see a different form of coupling with the same type of coil known as Interwave coupling. In many cases this will prove more efficient than the Brookmans coupling, and it is therefore as well to try it in place of Brookmans coupling in all cases where the latter is used.

The difference is very easy to follow, the coupling condenser in Interwave coupling being in series with the long-wave secondary instead of in series with the tuning condenser. The addition of a Spaghetti resistance across the coupling condenser, whether it be fixed or of the compression type, is also necessary.

Incidentally, you can differentiate between compression type variables and other variables by the fact that the former have a dotted arrow and the latter a full arrow.

AIM AT SHORT WIRING

When placing the components the most important point to watch is to keep the grid and plate leads as short as possible, particularly the former. Also when you come to wire up, keep these leads as free as possible from all other leads and from components. Don't forget that with screening between H.F. stages, or between an H.F. stage and a detector, it is just as necessary for the screen to pass between variable condensers as between coils.

With regard to the fixed resistances used in mains sets for obtaining automatic bias. The usual value is 1,000, and in many cases this is just right, but with some valves a smaller value is needed, and it is therefore advisable to use resistances as indicated by the valve makers or according to the valve data supplied.

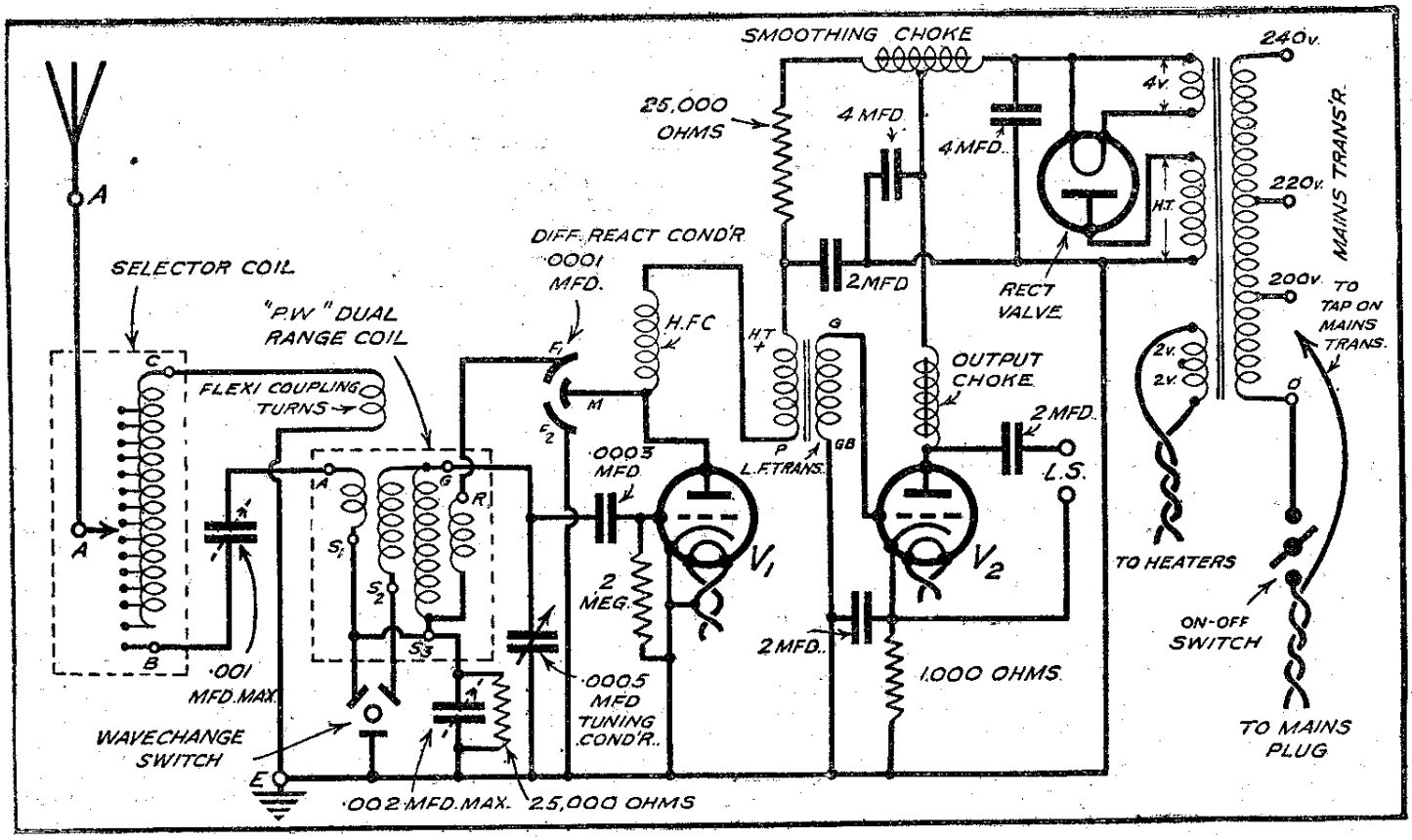
Another point in connection with mains circuits is that most input voltages are shown as being around the 200-volt mark. This is only a matter of form, and the circuits are just as suitable for lower A.C. voltages. Always remember, however, to see that a rectifier that is intended to be used with the particular transformer employed is chosen.

Where Extensers are not shown in wave-change circuits for tuning purposes, there is no objection to their being employed providing one contact of the wave-change switch is joined to one side of the tuning condenser. Connect up the fixed and moving vanes of the Extenser instead of the tuning condenser, and take the leads that would have gone to the wave-change switch instead to the self-changer contacts on the Extenser.

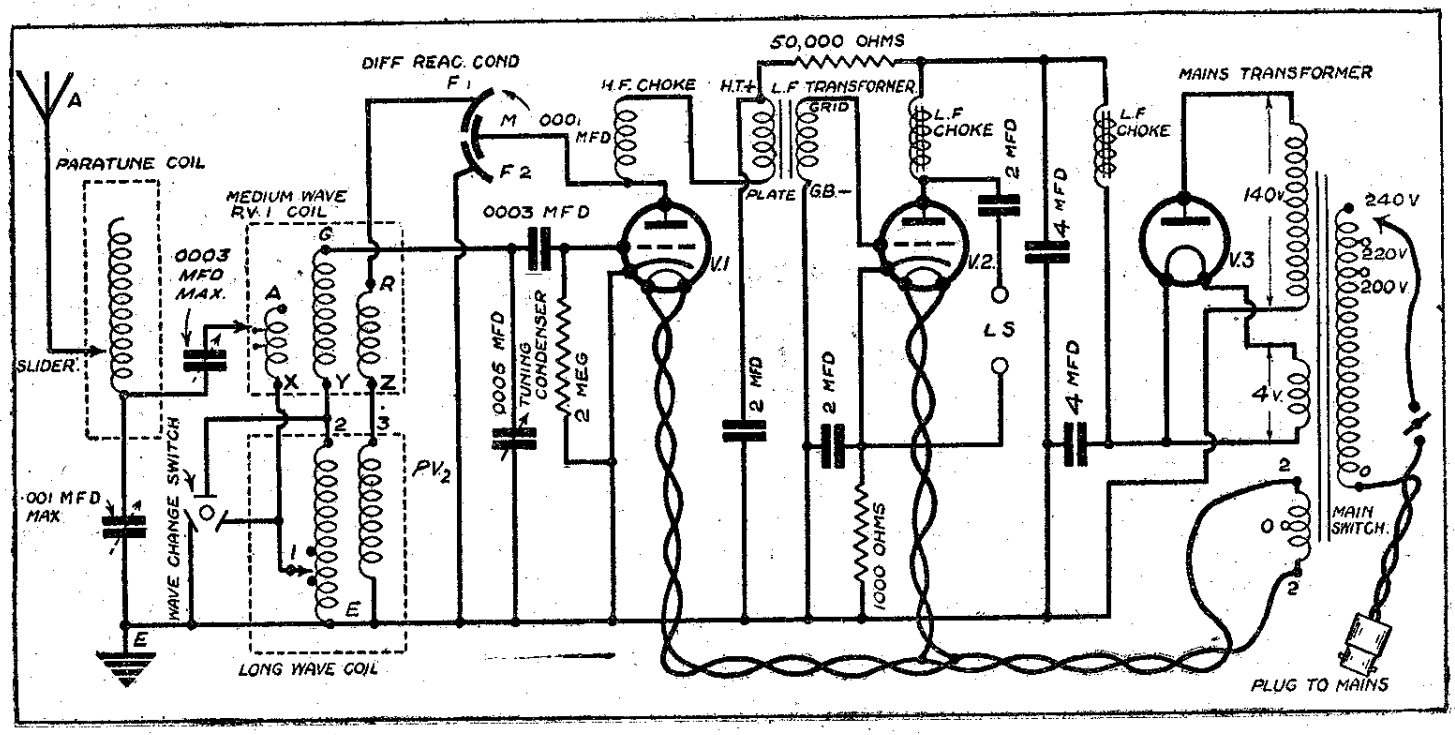
EARTH ALL SCREENS

All metal screening, no matter for what purpose it is employed, should be joined together and connected to the earth terminal, except, of course, in the case of a portable receiver, when it should go to L.T. negative instead.

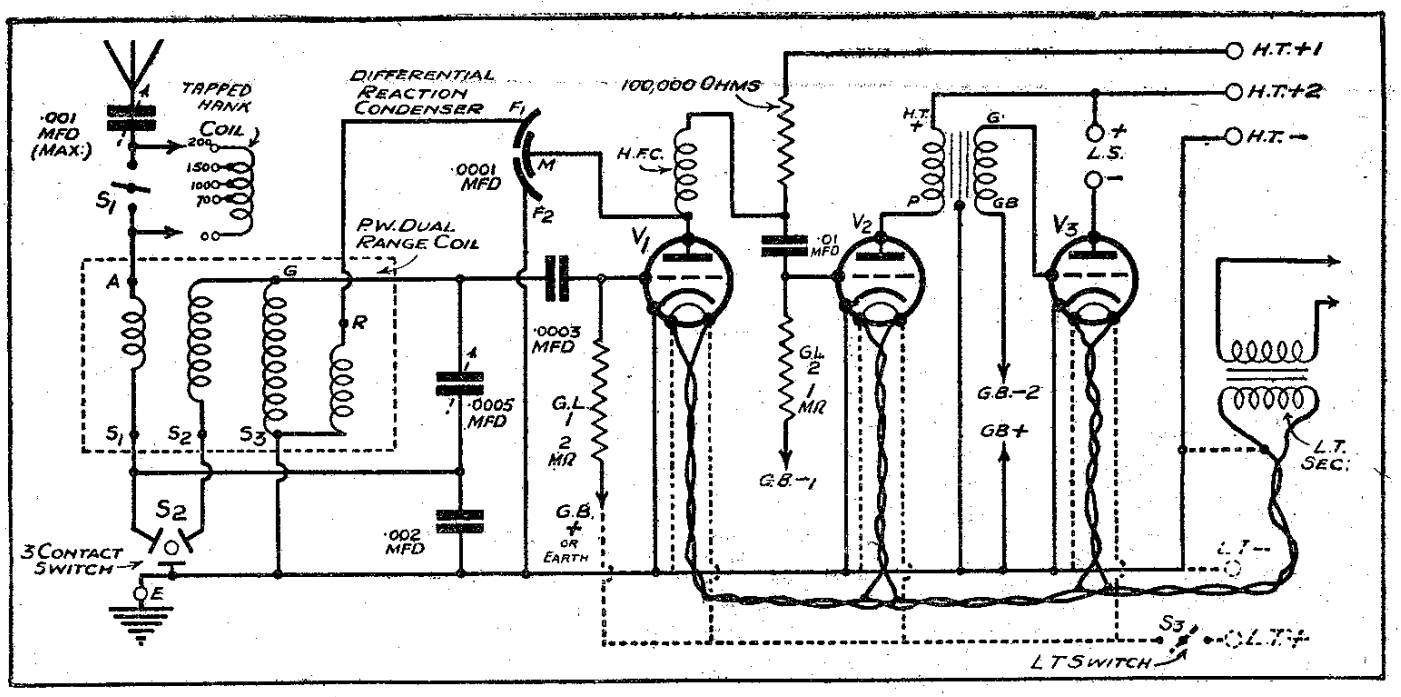
The leads to the heaters of indirectly-heated mains valves should be either of twisted rubber-covered flex or of twin armoured cable. If the latter is used the armouring on all pieces of wire should be joined up to earth. It is also often desirable to earth the cores and shrouding of L.F. chokes and transformers.



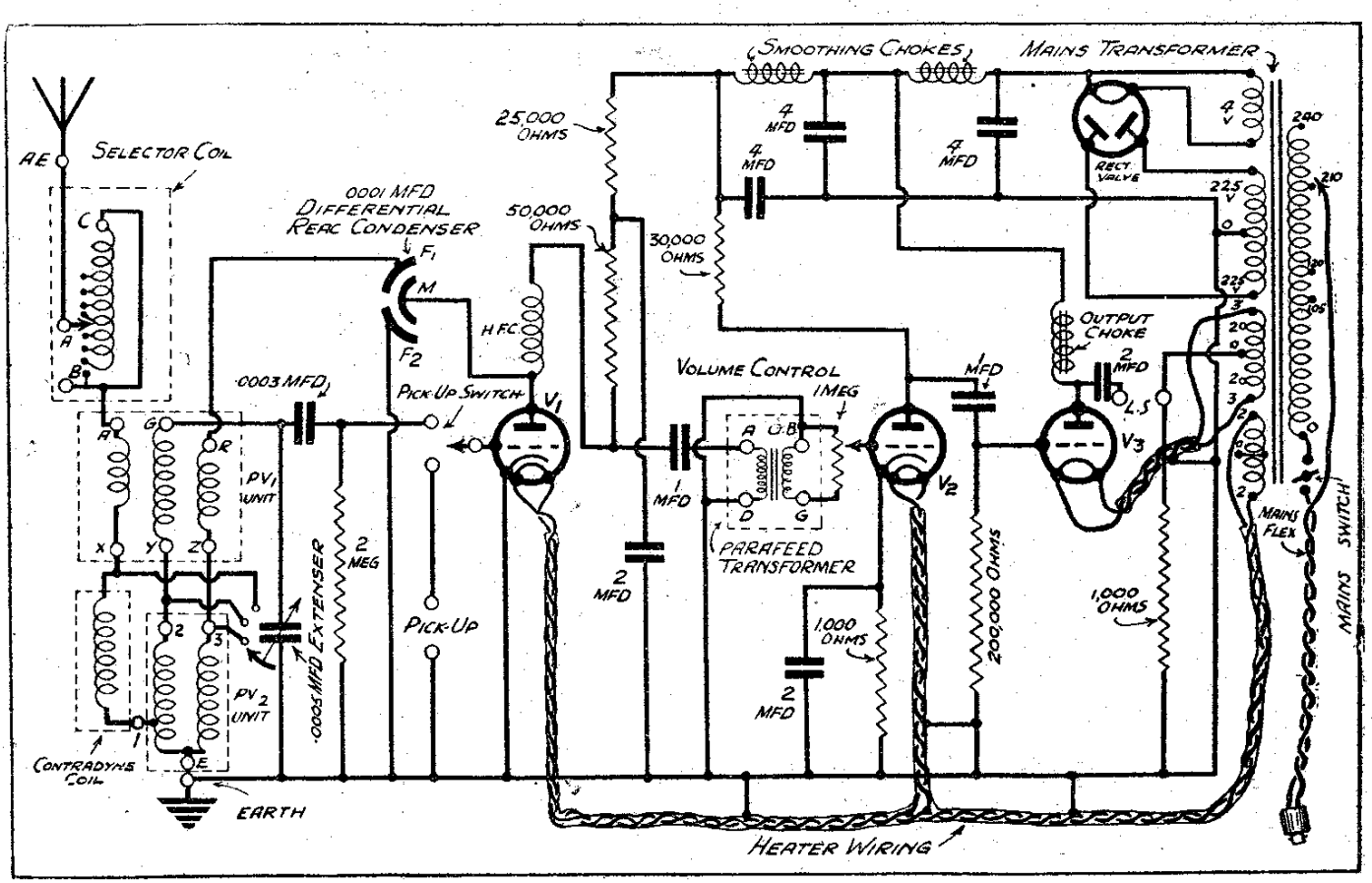
CIRCUIT No. 53. A very useful all-round all-mains two-valver, or three-valver if you count in the half-wave rectifier valve. The circuit is of the wave-change, detector and one L.F. type. The double band effect is provided by a "P.W." dual-range coil, and ample selectivity and signal strength is assured by the use of a selector coil, used in conjunction with flexi-coupling. The flexi-coupling turns consist of from one to four turns or so of flexible wire loosely wound round the outside of the dual-range coil, the best number being found by trial and varying according to the degree of selectivity required. The valve heaters are not shown joined up, for clearness, but they are both joined in parallel and connected across the wires coming from the 2-0-2-volt winding of the transformer.



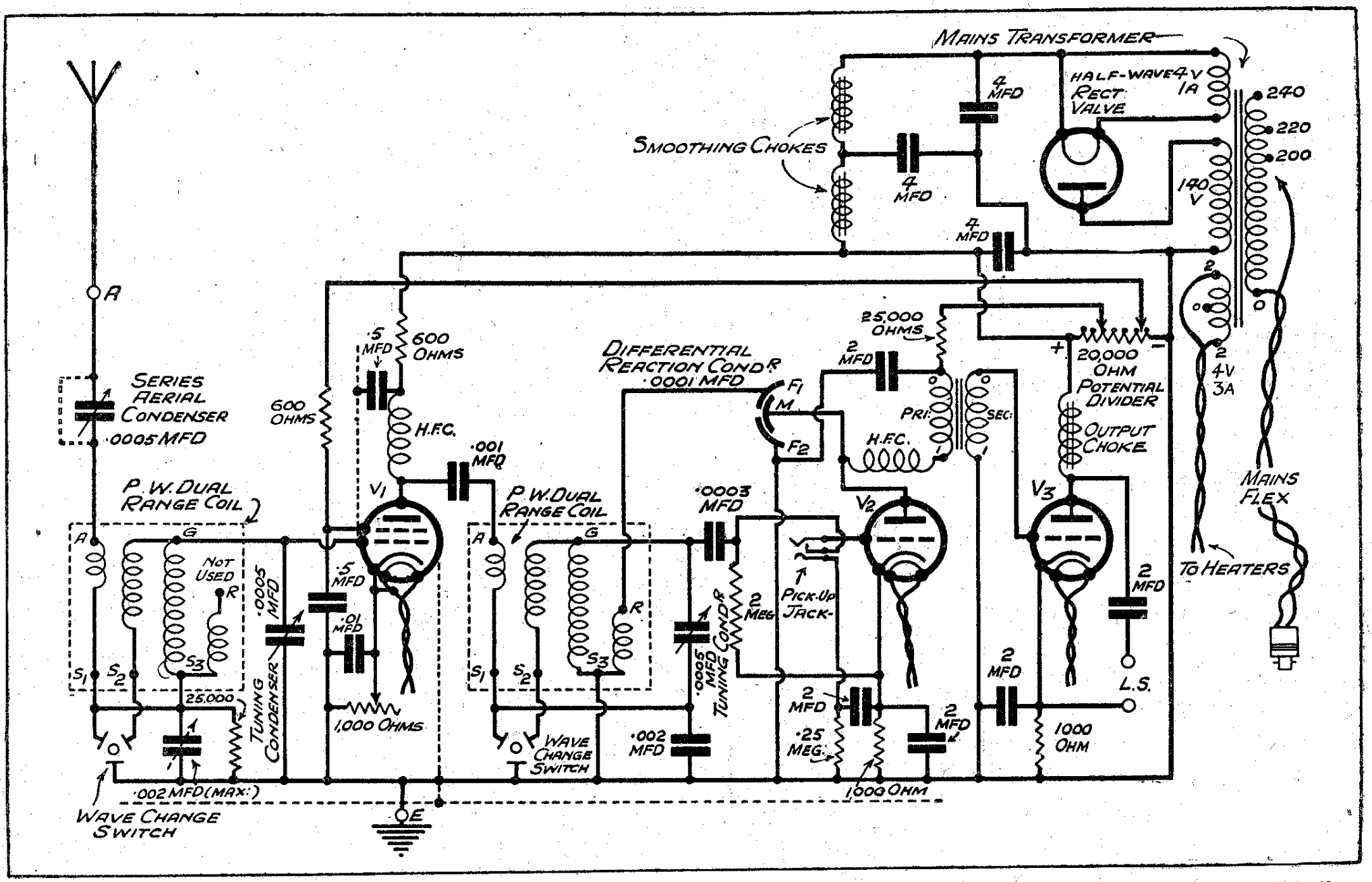
CIRCUIT No. 54. Here is the very latest type of circuit in the two-valve all-mains variety. The detector and L.F. part is similar to that of Circuit No. 53, but the remainder differs rather largely. A Paratune coil and method of coupling are used to obtain the necessary selectivity for modern conditions, and two P.V. coils are used for the tuned wave-change scheme. These coils are obtainable commercially from a large number of manufacturers, and are completely separated, thus avoiding all possibility of poor results due to unwanted interaction between long- and medium-wave windings. Once set to suit the local conditions prevailing, the two compression-type condensers do not have to be touched.



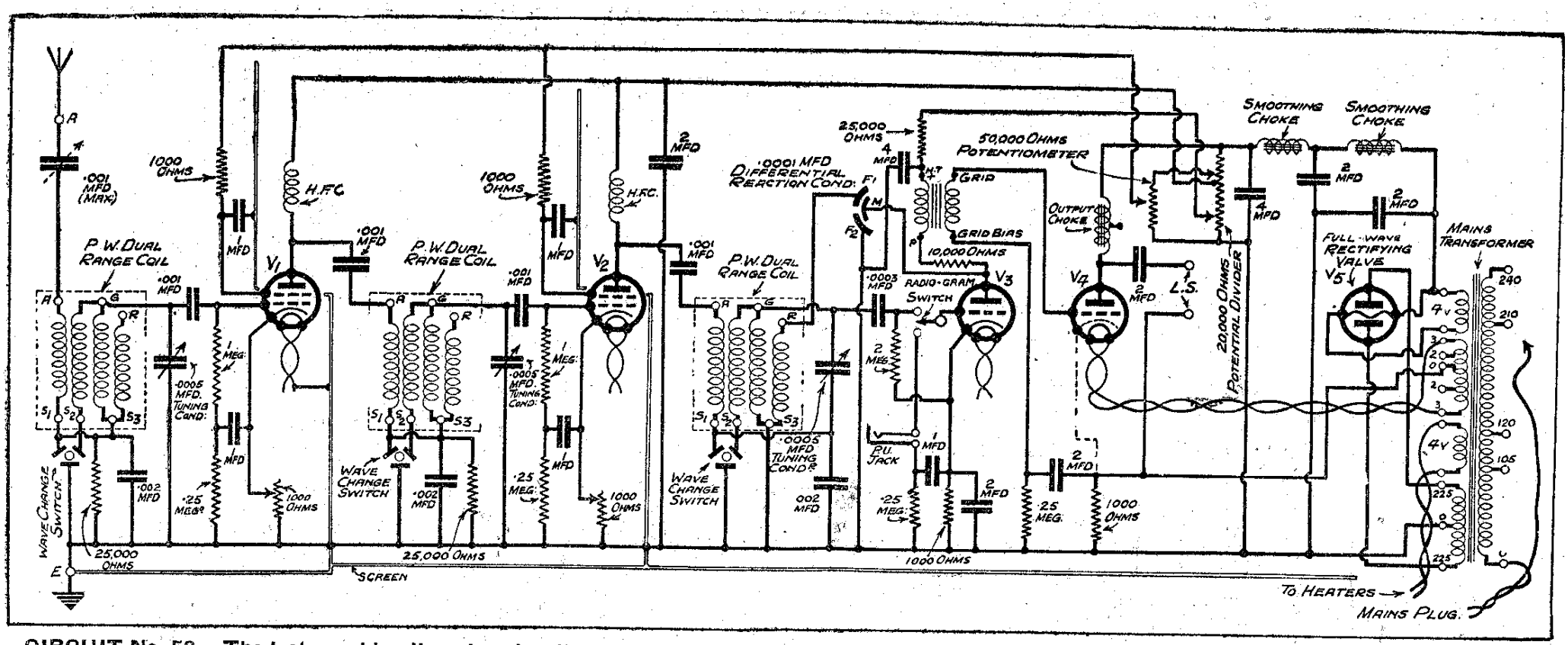
CIRCUIT No. 55. Here is a useful straightforward three-valver that may be used with either battery or mains valves. It has a separate transformer for the heaters of the mains valves, an ordinary mains unit being employed for the H.T. It is therefore a useful guide to the correct alterations to make when changing any simple "three" over to mains valves. When used on battery valves the dotted lines show how the filaments are connected up to the accumulator, excepting the dotted line to the secondary of the mains transformer. This wire indicates a connection which should be tried when mains valves are in use. The hank coil in the aerial circuit should be wound with 30 D.S.C. wire on a coil quoit and shorted cut for medium waves.



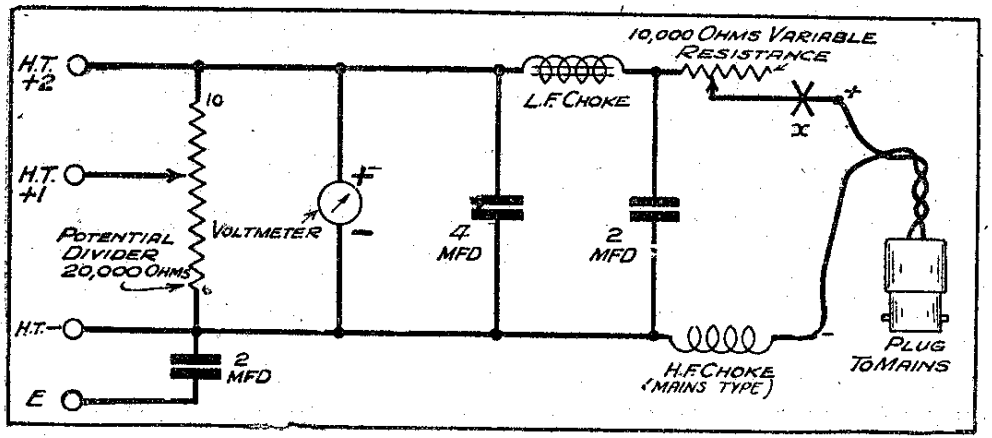
CIRCUIT No. 56. This circuit incorporates a scheme which is very popular at present for A.C. all-mains sets. The point referred to is the use of a directly-heated valve for the output, and the valve may be an ordinary battery one providing the filament consumption is fairly heavy. The filament of the directly-heated valve would be a 6-volt one, and is therefore supplied from a separate secondary winding on the transformer from that supplying the indirectly-heated valves, which have a rating of 4 volts. To keep hum at a minimum the heater and filament leads consist of twin wire with a metal covering of braid. The separate sections of this braid (it must be cut where the wires are joined) are connected direct to the earth wiring, the same as an ordinary screen would be.



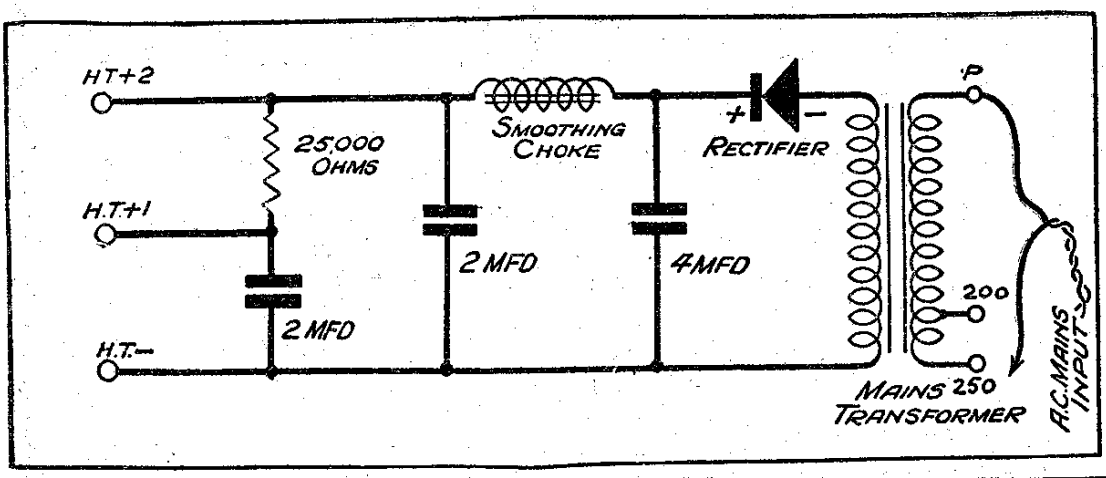
CIRCUIT No. 57. A particularly powerful mains set using a mains S.G. valve, and also provided with a jack for connecting a pick-up into the grid circuit of the detector valve. This jack automatically switches the detector over to radio when the pick-up plug is removed. A point particularly worthy of note is the way in which the automatic biasing resistance is arranged on the detector so that the latter receives bias only when the pick-up is in circuit. The ·0005 series aerial condenser is of the solid-dielectric, completely variable type, the dotted line across it indicating that it can be quickly shorted out. This is effected by turning the moving vanes right to their minimum position, where they make contact with a small piece of copper foil that is attached to one of the nuts and bolts holding the fixed vanes in position, thus shorting the condenser.



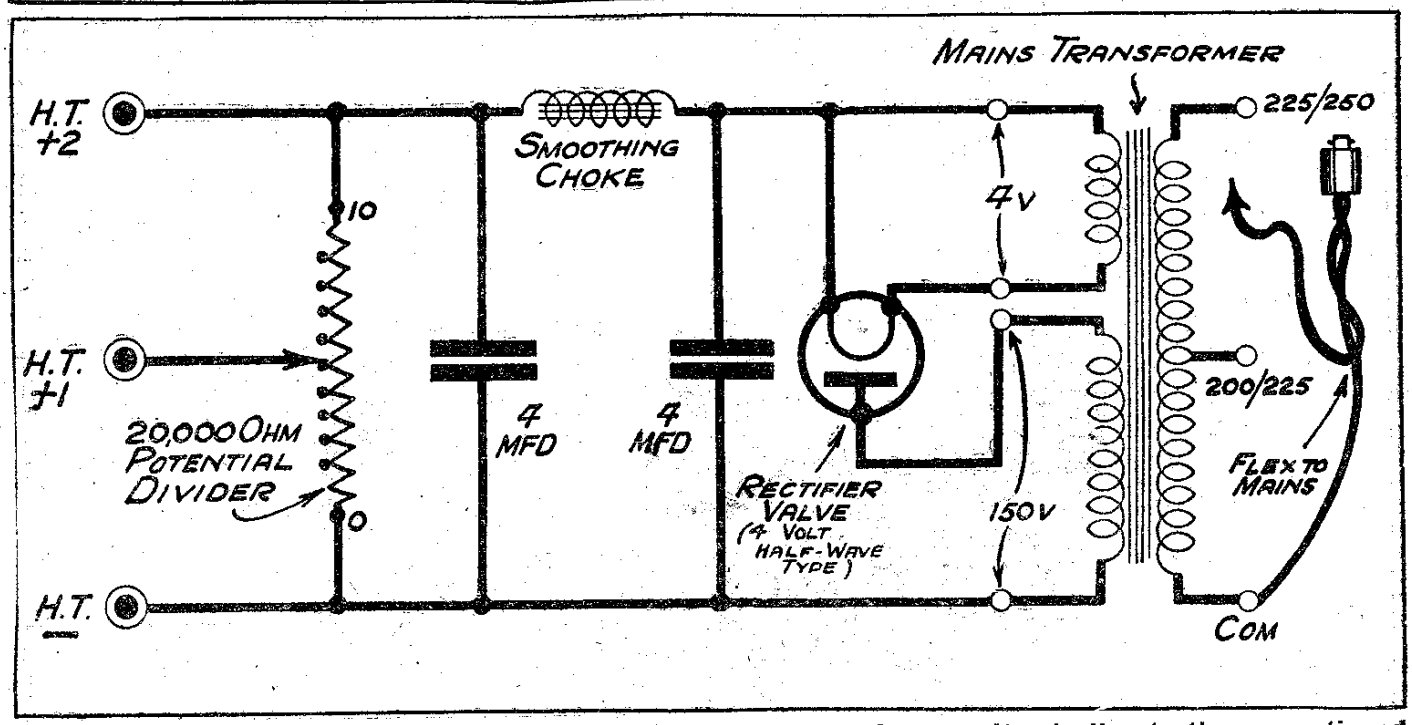
CIRCUIT No. 58. The last word in all-mains circuits. Two stages of S.G. amplification are used, and consequently very elaborate screening is necessary between the H.F. valves and the detector. The screen over the baseboard should incidentally be carried over the whole length, including the L.F. and mains part of it. Both a pick-up plug and switch are provided so that the pick-up can be quickly and conveniently disconnected if required, while the convenience of a change-over switch on the panel is retained. The output has a directly-heated valve run from a 6-volt winding, but as the dotted cathode and cathode connection indicate, a mains valve of the indirectly-heated type can be used if desired. In this case, of course, it would be wired up in parallel with the other heaters.



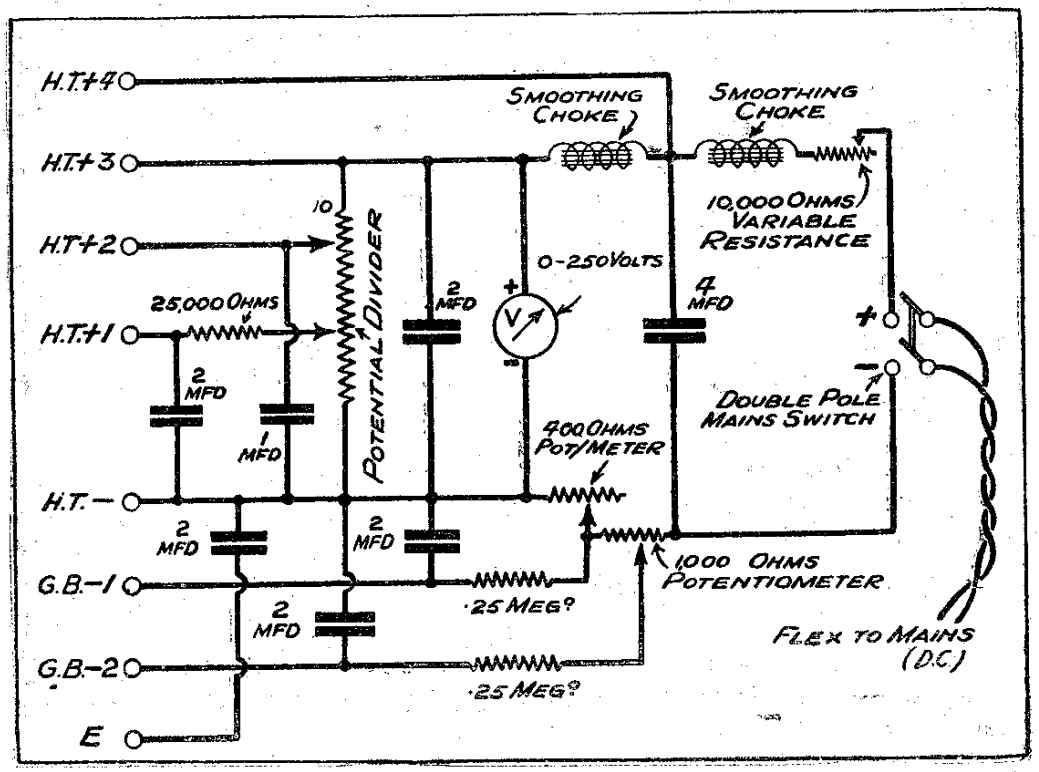
CIRCUIT No. 59. For use with D.C. mains, this H.T. unit is suitable for use with simple sets of the Det. and one or two L.F. type. There are two output tappings, the variable one being intended for the detector, which should have a de-coupling device already in circuit in the set. A 2- or 4-mfd. condenser should be joined across H.T. positive 1 and H.T. minus. The earth lead itself should be connected to the E terminal on the unit, and to nowhere else. The variable 10,000-ohm resistance in series with the mains enables the voltage on H.T. positive 2 to be varied, and the value is indicated by the voltmeter. As the latter is permanently in circuit it does not need to have a very high resistance. The H.F. choke in series with the negative mains lead is often very useful in eliminating peculiar cracklings that are sometimes experienced with mains units of the D.C. type. Sometimes, however, it will be found to be much more effective when connected in the positive lead at the point marked X. As the better position depends upon the particular mains in use, both positions should be tried.



CIRCUIT No. 60. An extremely simple A.C. mains H.T. unit, suitable for sets of the detector and L.F. type. A half-wave rectifier of the dry type is employed. The H.T. plus 1 tapping, which is supplied via the fixed resistance, is intended for the detector valve. If the voltage appears too high for the detector in use when the 25,000-ohm resistance is employed, one of a higher value may be substituted.



CIRCUIT No. 61. Another simple A.C. unit which is suitable for circuits similar to those mentioned for Circuit No. 60. It employs a half-wave valve rectifier instead of one of the "dry" type, and a potential divider is used to break down the voltage for the detector. If a de-coupling resistance and condenser are not incorporated in the receiver for the detector valve, a 2- or 4-mfd. fixed condenser should be connected across H.T. positive 1 and H.T. —.



CIRCUIT No. 62. An elaborate D.C. mains unit which provides grid bias as well as H.T., and which is suitable for multi-valve receivers using up to four or five valves. There are four positive H.T. tappings (two variable) and two continuously variable grid-bias tappings. These latter are varied by the 400-ohm and 1,000-ohm potentiometers used as variable resistances, G.B.—1 giving a smaller voltage range for use on the first L.F. stage. The potential divider on to which the variable H.T. tappings are taken should have a resistance of not less than 20,000 ohms.

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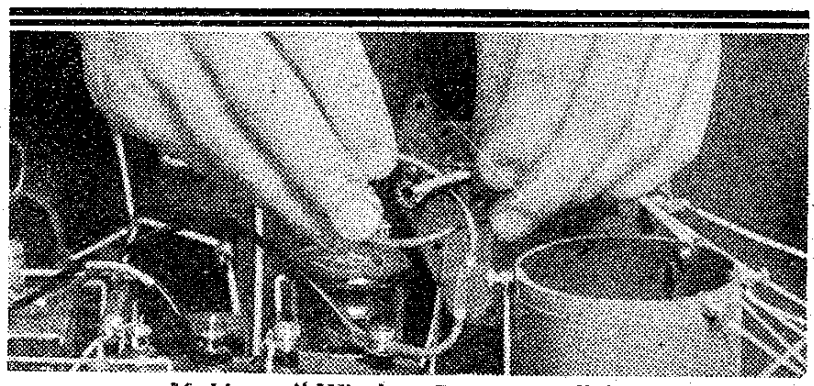

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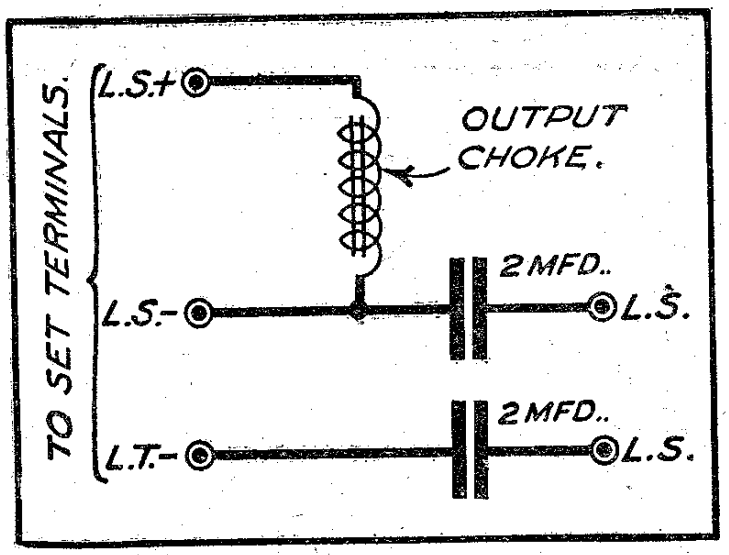
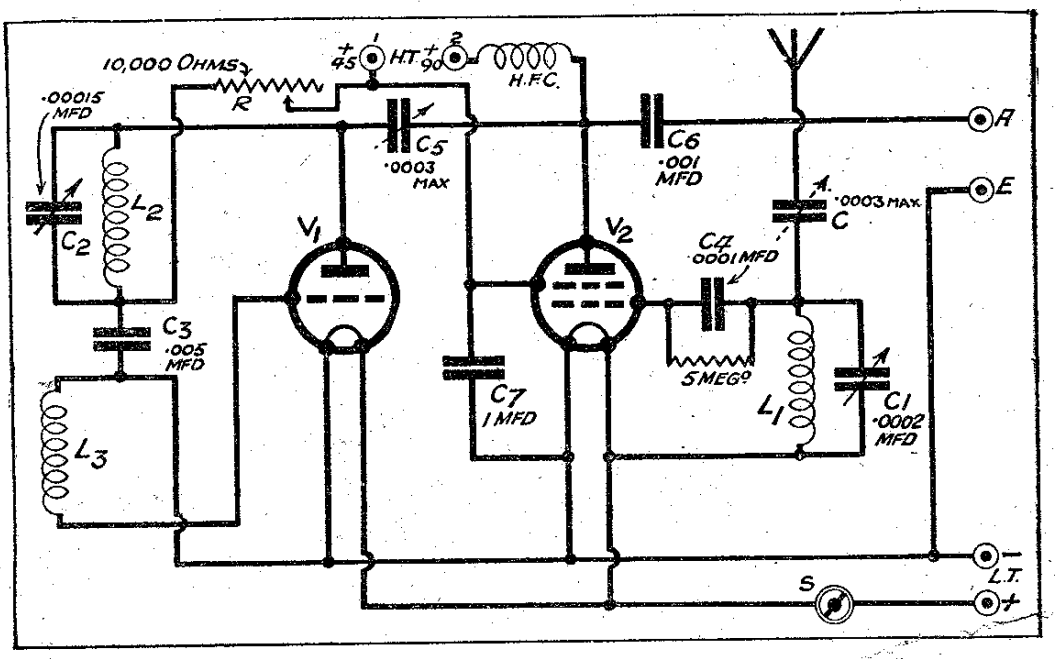
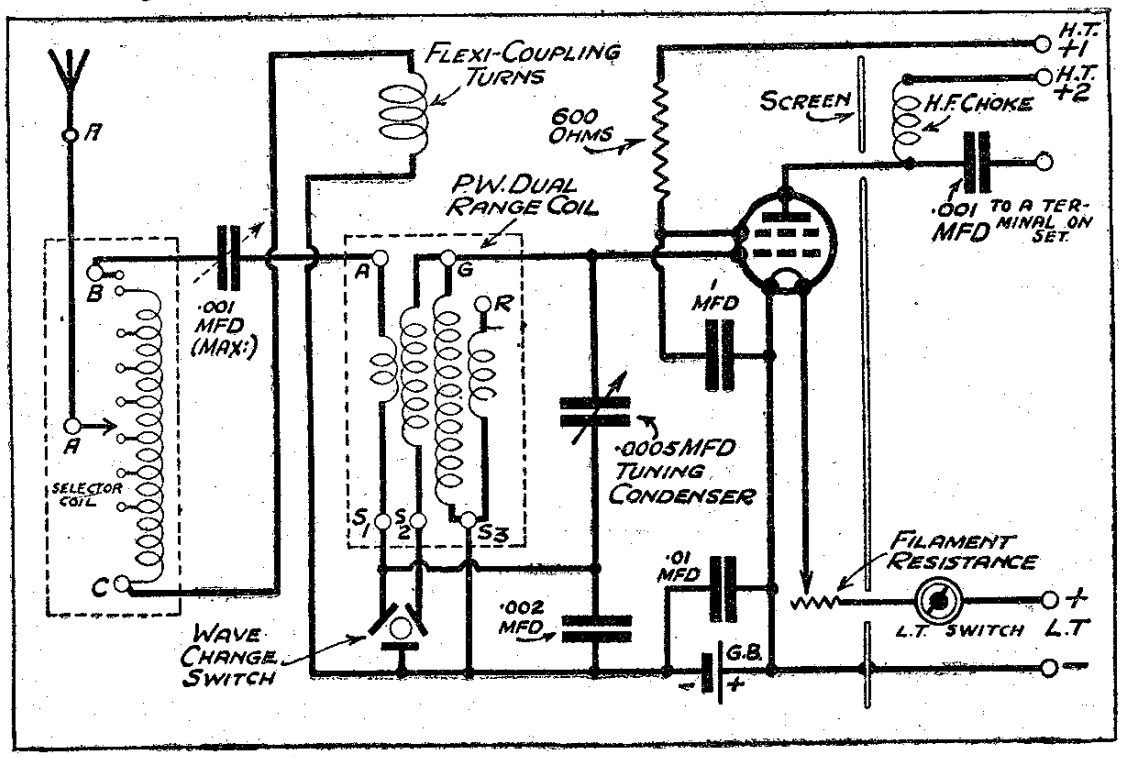


CIRCUIT No. 63. Here are the standard connections for an output choke-filter circuit. With battery receivers and sets run from A.C. mains, whether by means of a mains unit or by all-mains schemes, it is not usual to incorporate the second fixed condenser, namely, the one between L.T.— and one L.S. terminal. In such cases it can be omitted, L.T. negative then being joined direct to the loud-speaker terminal.

Where this second condenser is particularly desirable, in fact, really necessary, is with sets operated from D.C. mains. Very often the positive mains lead is earthed, and this condenser prevents the loud speaker being live in relation to earth. It is best to incorporate it whether the positive lead is earthed or not.

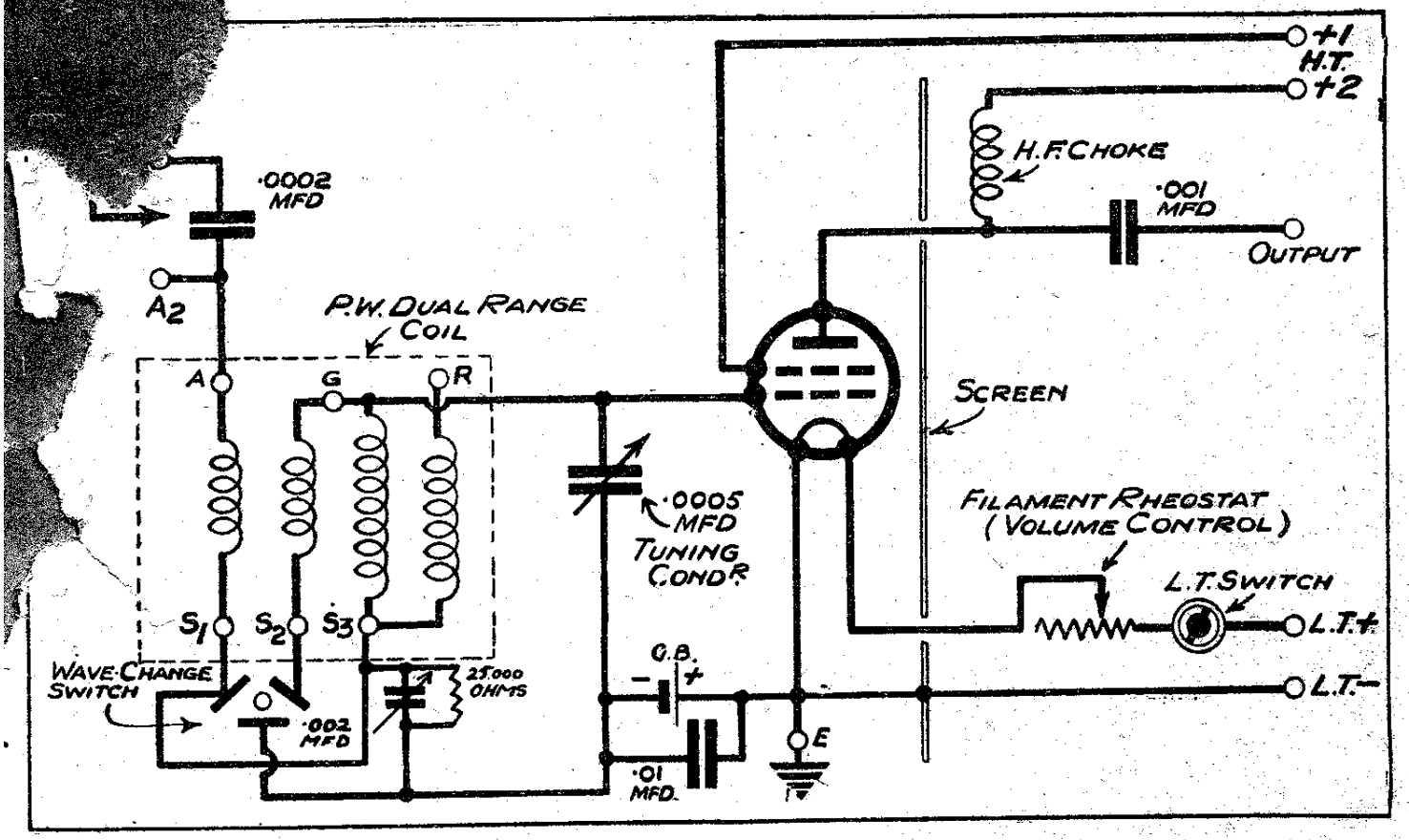
CIRCUIT No. 64. A circuit which, when placed in front of an ordinary receiver employing one or more stages of high-frequency amplification, turns it into a super-heterodyne set. V_1 acts as the oscillator, and the S.G. valve as the first detector. It is only intended for use on short waves, as a means of converting a broadcast receiver to a short-wave one. The coil L_1 and the condenser C_1 should tune the aerial circuit to the wave-length of the desired station, while the L_2, C_2 circuit should tune to such a wave-length, in conjunction with the reaction coil L_3, as to produce an intermediate frequency to suit the tuning of the broadcast H.F. stages which may be worked on medium or long waves.

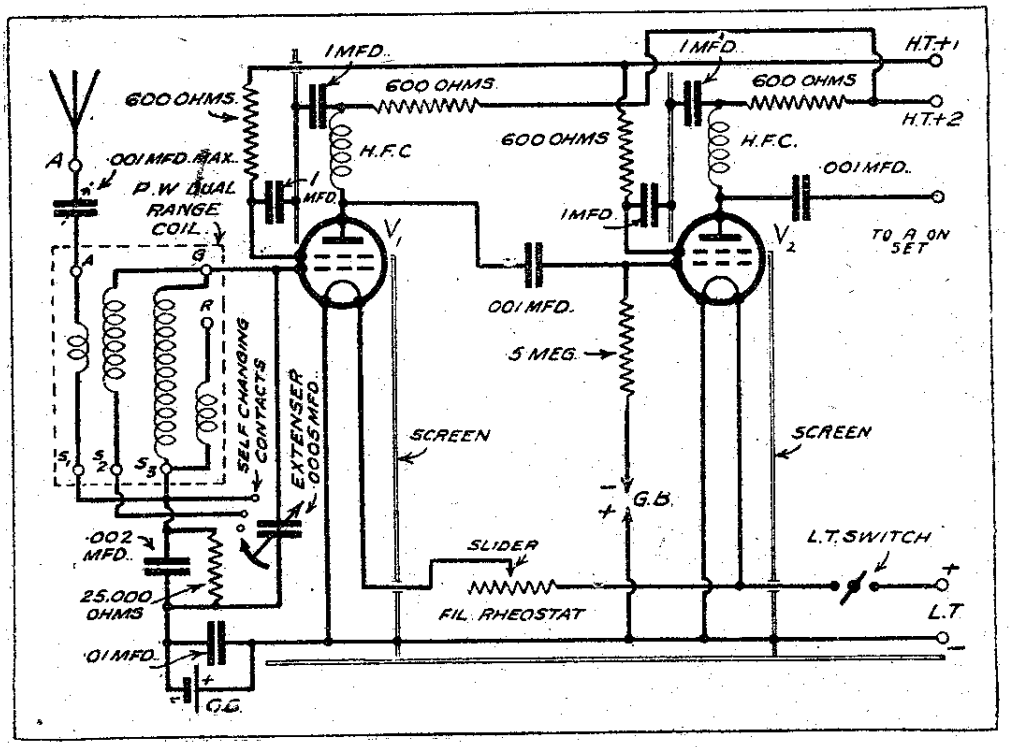




CIRCUIT No. 65. A selective screened-grid H.F. unit for use with sets of the det. and L.F. type. The earth should be left connected to the set, but the aerial removed from its present terminal and taken to the aerial terminal on the unit. The aerial terminal of the set is now connected to the output terminal of the unit, which is the one joined to the ·001 fixed condenser. The same batteries can be used for the unit as for the set.

READ PAGE 2 BEFORE CHOOSING YOUR CIRCUIT

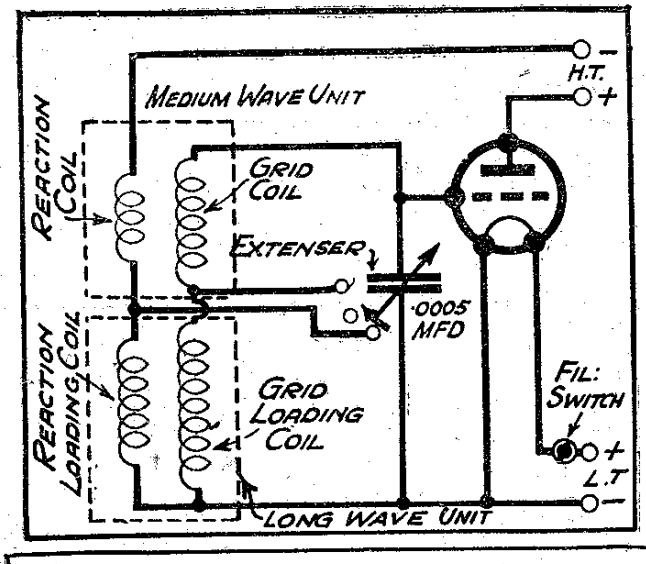




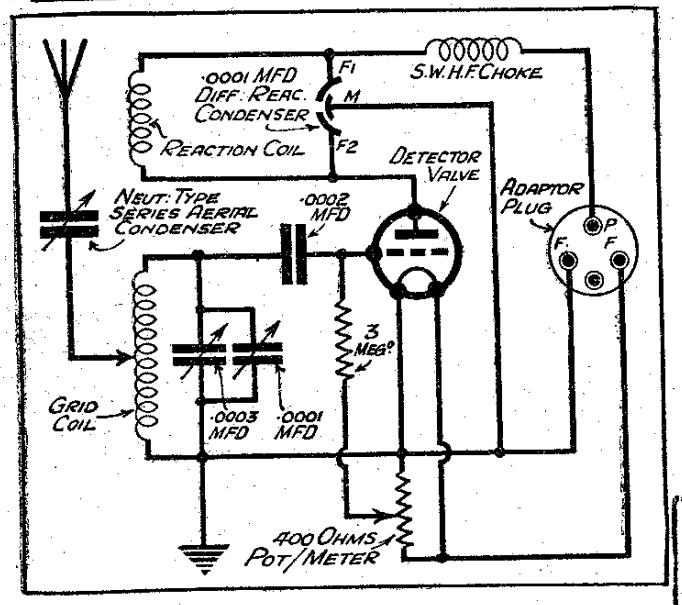
CIRCUIT No. 66, above, is an H.F. unit which is connected up in the same way as the Circuit No. 65 to det. and L.F. types of receivers. It is, however, of a much simpler kind, having just a plain dual-range coil for the wave-change tuning arrangement. A certain measure of adjustable selectivity is, however, provided by the ·0002 fixed condenser in series with the aerial lead. This is brought in or out out of circuit according to whether the aerial lead is taken to the A_1 or the A_2 terminal. A point that must be borne in mind with this and all other H.F. units is that there is a separate filament switch for it, so don't just switch off the set and leave the unit turned on.

CIRCUIT No. 67. This is the very last word in H.F. units for adding on to simple sets. It employs two S.G. stages of amplification, and is capable of turning quite a modest set into a really powerful long-distance outfit. The first S.G. valve has a tuned-grid circuit in the form of a dual-range coil, the wave-changing for which is done by means of the self-changing contacts on an Extenser. This first valve is then aperiodically coupled to the next valve, which has its anode circuit parallel-fed on to the grid circuit of the detector valve in the set in the usual manner.

Fairly elaborate screening is necessary in such a circuit. Copper foil should run over the whole of the baseboard, and the valves must be arranged to pass through the screens as indicated. The filament resistance in the L.T. supply to the first valve acts as a convenient volume control, and ample de-coupling has been provided in the H.T. lead to the screening grid and the anodes. The method of connecting up to a receiver is the same as that described for the unit of Circuit No. 65.



CIRCUIT No. 68. An extremely simple wave-meter circuit. It covers both wave-bands on one dial, changing o carried out automatically by the Extens also avoids the necessity of two wav readings to each dial reading. Both the co are wound on Pirtoid or similar type coil fo s, the long-wave one being 3½ in. in diameter and the other 2½ in. The long-wave former should be about 3½ in. long, and the medium one 2½ in. Start winding the grid loading coil with 30 D.S.C. wire, and put on 150 turns. The reaction loading c should start about ¼ in. from the grid windi and consist of 50 turns of the same wire. Wind t medium-wave unit in just the same way, but us 24 D.S.C. wire and put on 60 grid turns and 2 reaction.

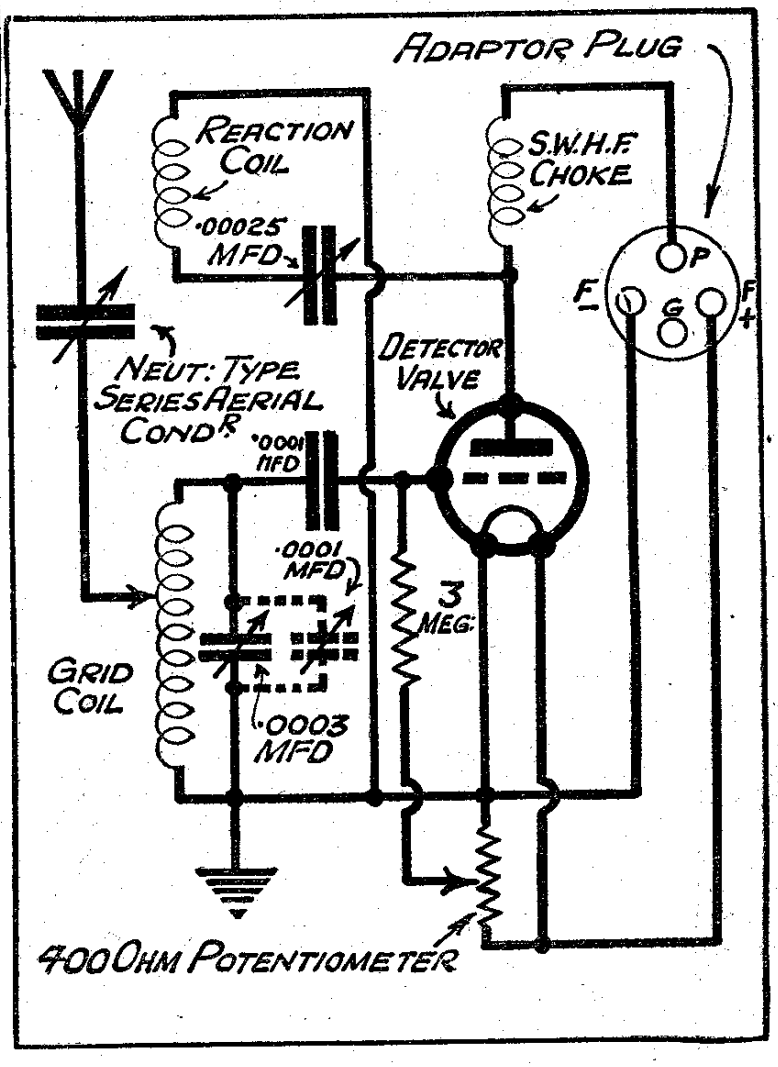


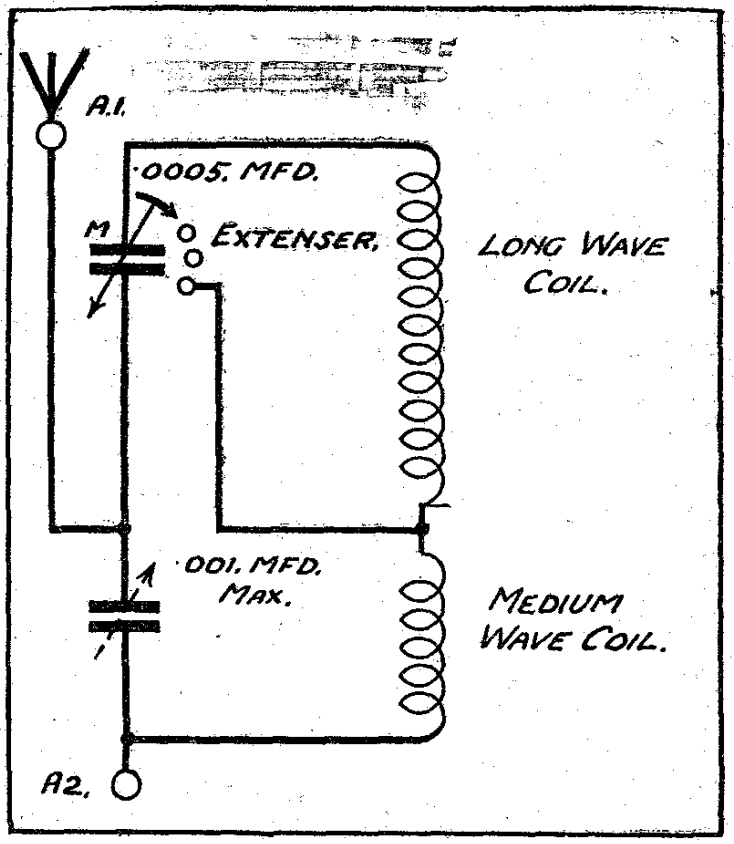
CIRCUIT No. 69. This is a short-wave adaptor which enables an ordinary receiver to be used on short waves without any alteration to its wiring or components. It employs differential type reaction, while the similar type of adaptor shown in the circuit below has ordinary Reinartz type reaction. The method of using the unit is the same as the instructions given for Circuit No. 70.

CIRCUIT No. 70. As explained above, this is a short-wave adaptor that can be used with any ordinary type of set to convert it into a short-wave one. The method of using is as follows :

On the right is seen an adaptor plug which has four pins on it arranged in the same manner as the pins of a valve. To this there are three flex leads connected. The detector valve is removed from the receiver and the plug is inserted in its place, the detector valve itself being put into the valve holder on the new adaptor. The tuning circuits of the receiver are now out of circuit, and all the tuning is done instead on the adaptor, only the L.F. components of the receiver being in circuit.

Adjustment of the H.T. voltage to the detector tapping of the set may become necessary in order to obtain smooth reaction, as also may adjustments of the potentiometer. The ·0001 variable condenser, in parallel with the ·0003 tuning condenser, makes the tuning of weak stations much easier, due to its smaller effects on tuning, coarse adjustments of which may be made on the main tuning condenser.



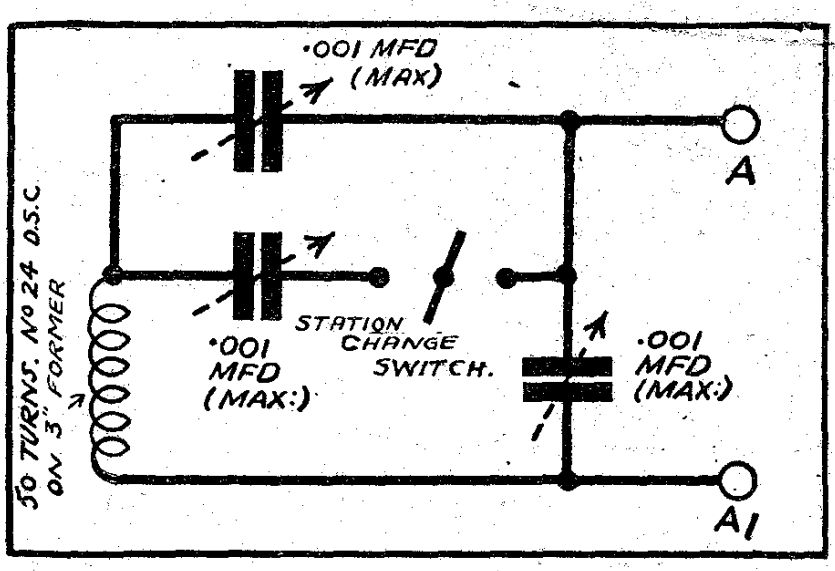


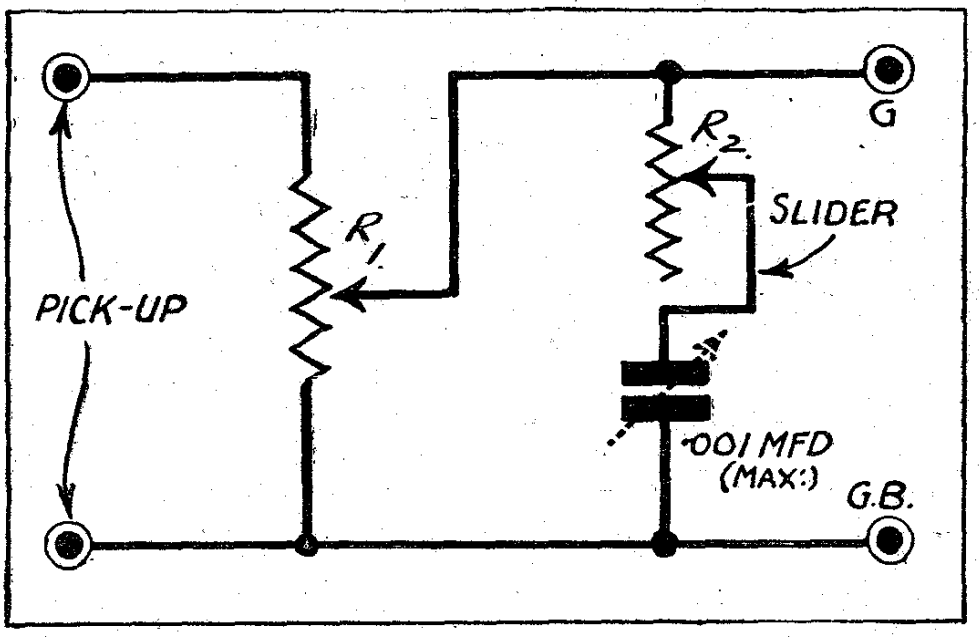
CIRCUIT No. 71. A particularly useful and convenient form of rejector that will work on long waves as well as on the medium waves. The changing from one band to the other is accomplished by means of the Extenser used for tuning, which automatically changes the wave-length range.

Wind the medium-wave coil on a 2 in. diameter former with 30 D.S.C. wire, putting on between 65 and 70 turns. The long-wave coil can quite conveniently be wound on a coil quoit, also with 30 D.S.C. wire, about 120 to 130 turns being employed.

The ·001 compression type condenser enables the degree of coupling to the rejector to be altered so that the best value can be found for the particular aerial on which it is used. Naturally, any alteration made to this condenser will make a further adjustment of the Extenser necessary. The aerial of the receiver is joined to the A_2 terminal.

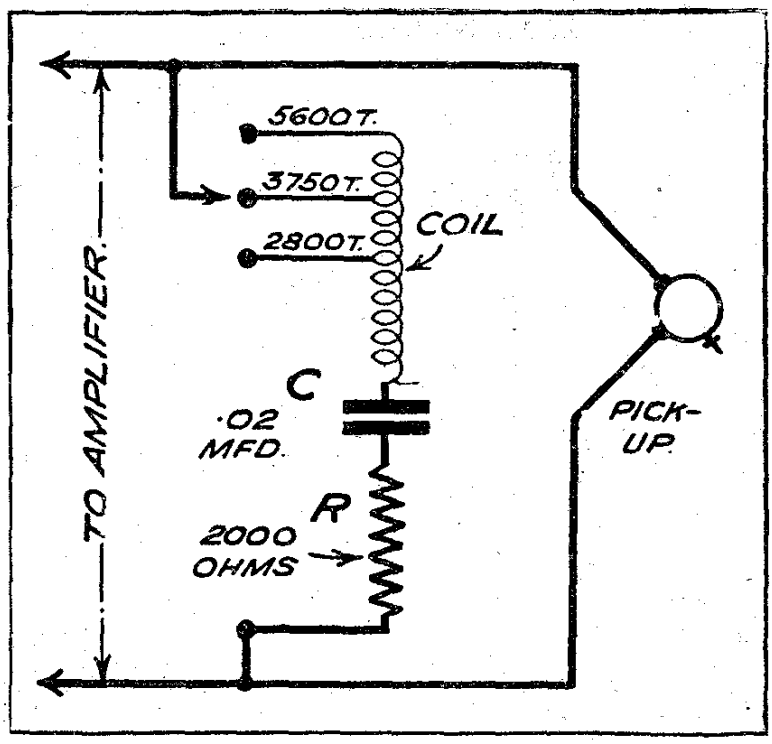
CIRCUIT No. 72. This rejector works on the same principle as that of Circuit No. 71, but instead of covering both wave-bands, it is arranged to cut out one or the other of two local transmissions. When set all that has to be done to change it from cutting out one station to the other is to manipulate the switch. With this switch open the upper of the two tuning ·001 compression type condensers is adjusted to cut out the lower wave-length local. It is then left set at this position, and the switch is closed. The second of the tuning ·001's is now adjusted until the higher wave-length local disappears.



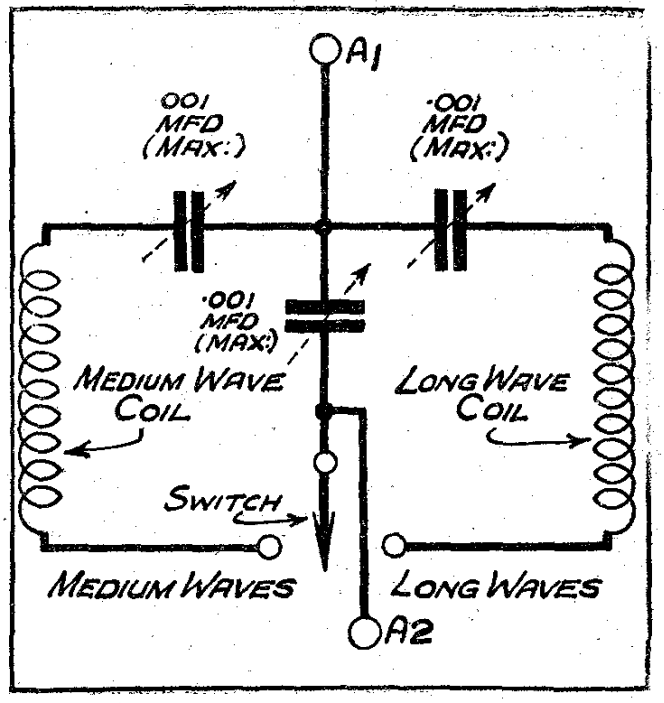


CIRCUIT No. 73. A particularly useful unit can be made up from this circuit, which shows a combined scheme for volume controlling a pick-up, and also for tone controlling so far as the amount of higher frequencies is concerned. The potentiometer R_1 should have a value around 250,000 ohms, and is used for controlling the volume.

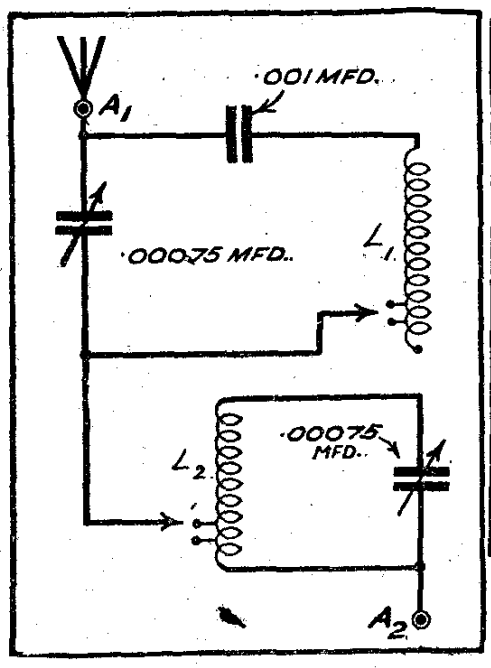
The resistance R_2 may have a value of about 50,000 ohms, and according to the amount of resistance in circuit so the by-pass effect of the condenser will vary. The range of by-passing will depend upon the setting of this condenser. Sometimes a larger value fixed condenser will prove more effective if a large cut-off is desirable.



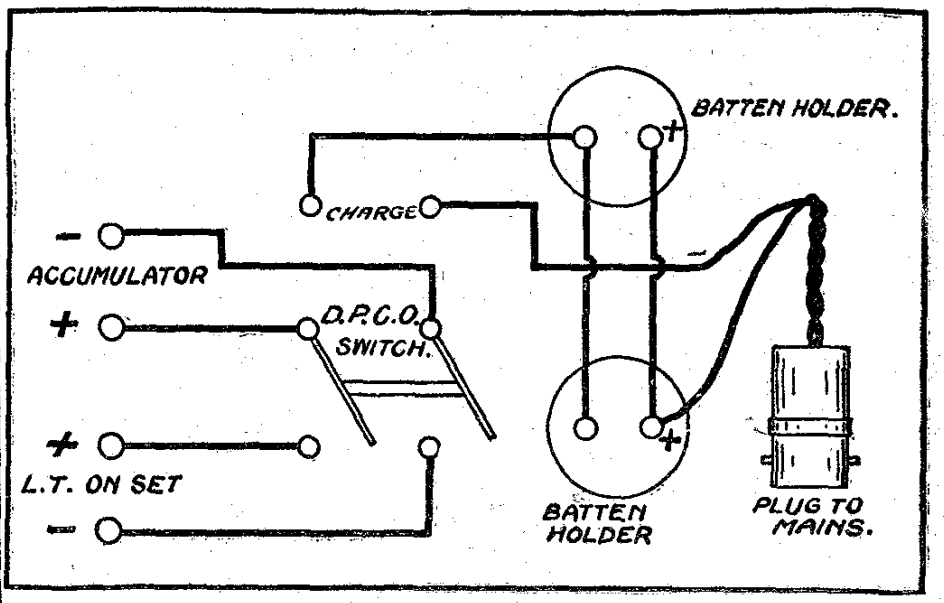
CIRCUIT No. 74. Many pick-ups have a tendency to peak at some particular point of their frequency characteristic curve. This circuit shows how such peaks can be cut out without the remainder of the curve being upset. The values given are those which will, in most cases, prove effective, three possible taps being available on the coil, which consists of the number of turns shown, wound on a 1 in. dia. bobbin, 1½ in. long. The wire is No. 40 S.S.C. copper. The object of the resistance is so that the by-pass effect of the circuit shall not be too defined. The scheme is really just a tuned series circuit which allows certain frequencies to pass easily, and the resistance has the effect of flattening its resonance curve.



CIRCUIT No. 75. Here is a change-over type of rejector which will work on both wave-bands. The switch is of the single-pole, change-over type, and when over to the left gives medium waves, and when over to the right, long waves. The tuning is the same as other rejectors of this type, and a plug-in coil can quite suitably be employed. That for the medium waves would be about a No. 50 or No. 60, and for the long waves a No. 200 or No. 250. A_1 is joined direct to the aerial, and A_2 to the aerial terminal on the set.



CIRCUIT No. 76. This circuit enables two stations to be cut out at once. Both coils can consist of 70 turns of 30 D.S.C. on 2-in. formers, tapped at the 50th and 60th turns.



CIRCUIT No. 77. An L.T. accumulator charger for use on D.C. mains. It is so arranged that the accumulator and set are permanently connected up, the switch making the necessary change-over. If the switch is provided with a central or "off" position, the mains plug can also be left permanently in position. When this plug is inserted it is important to see that it is in the right way round, the best method being to use a piece of pole-finding paper, taking care not to get any shocks while doing so. The bulbs to use depend upon the charging rate required. Use lamps of the same voltage as the mains, and find the approximate current they pass by dividing the mains voltage into their wattage.

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